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THE GEOGRAPHY OF AMERICAN CITIES.

BY

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Introduction.—Students of municipal conditions generally ascribe the aggregation of population in cities to one or more of three main causes: commercial, industrial, or political activity. Thus, New York, New Orleans, Chicago, or San Francisco would be classed as commercial; Pittsburg, Fall River, or Birmingham as industrial; and Washington and many of the State capitals as political centres. In the first two classes at least, and in many cases in the last also, the cause of the growth of a city in any particular location may be traced back a step farther and find its foundation in the geographical conditions which have favoured commerce, industrial activity, or political importance. In some cases the conditions have been such as to bring the city almost exclusively under one type, as the commercial importance of New Orleans; while others may in varying degree come under any one of the three classes, as Boston. There is, however, still another class of cities which are neither commercial nor industrial, nor political in character—what may be called the social centres, popular or health resorts grown up in response to pleasing geographic conditions, either climate or location, as Newport, Atlantic City, or Asheville. Among the cities of the United States examples of all classes may be found, the study of a few typical examples of which serves to bring out the conditions that may be regarded as controlling factors for each class.

Commercial Centres.—Commercial centres grow up in response to geographic conditions favouring trade and communication at points which are natural outlets from, or points of entry to, well-settled, productive areas. The means of communication may be varied—by water, on the ocean, lakes, rivers, or canals, or on land, by

railroads, wagons, or pack-trains, and it may be such as to cover both home and foreign countries or only a limited area of one country. According to the local conditions, therefore, all commercial cities might be classed under two heads—(1) centres of foreign commerce, ocean ports, and some river ports; and (2) centres of domestic commerce, lake, canal and most river ports, and railroad cities. With hardly a single exception all the great commercial centres of both classes, in the United States, are located on bodies of navigable water, while those so situated as to enjoy ocean commerce are, as a rule, the most important. Chicago and St. Louis are the notable exceptions.

The natural conditions favouring the growth of important centres of foreign commerce are uniform throughout the country; a good harbour with a natural or easily-improved deep channel, safe anchorage, and shores of such a character as to facilitate the construction of docks and the handling of freight. At the present time the question of railroad facilities on the water front is an important consideration in the establishment of new, or the improvement of old, ports. But harbourage alone is not enough; the port must also lie near a wide extent of productive country with good routes of travel, either rivers and canals or railroads, by which goods for export may be collected, and goods imported may be distributed throughout the region. New York is a good example; for, with an excellent natural harbour and many miles of water front, her commercial superiority over the other Atlantic cities dates only from the completion of the Erie Canal, by which cheap and ready communication was afforded with the productive areas of the central West through the natural gateway along the Mohawk Valley. The other ports—Boston, Philadelphia, and Baltimore—up to that time the commercial rivals of New York, all possessed good harbour facilities, but, with no Mohawk valleys to be improved for their benefit, soon fell behind. The importance of river communication is illustrated in the case of New Orleans, which benefited by the vast area reached by the navigable courses of the Mississippi and its tributaries, and ranked as the first port in the country until the development of the trunk line railroads about 1870. For the railroads, with other conditions equal, the shortest route through the most populous country was the best. It was only natural, then, that New York, with its easy route through the Mohawk Valley and down the Hudson, with a better harbour, located several hundred miles nearer the important markets of western Europe, and already the greatest port on the Atlantic coast, should gain the supremacy.

Through a fortunate combination of geographic conditions the coasts of the United States are particularly adapted to a great ocean commerce, there being many good natural harbours suitable for commercial centres, with but relatively little expense in improvement. The main factor in producing the harbours has been a depression of the coastal areas by which the mouths of the rivers and the lower parts of their valleys have been entered or embayed by the sea. The drowned rivers have made good ship channels for entrance; the projecting headlands, made by the unsubmerged inter-stream uplands, have furnished the best of natural breakwaters to protect the shipping from storms; and the region about the depressed areas is in most cases well suited for the growth of a large city. Another factor which has favoured the growth of the larger American ports has been the absence of lofty mountains, which would act as effective barriers to communication with the extensive productive areas of the interior.

The importance of the coastal depression may be seen in the fact that, with the single exception of New Orleans, every important port in the country owes its harbour to the presence of a drowned river; not only in the case of the Atlantic ports, where the depression has been most marked, but also on the Gulf and Pacific coasts as well. Perhaps the most striking single instances are those of Philadelphia and Baltimore, which, though over 100 miles from the sea, rank as the third and fourth ports of the Atlantic coast. The position of these ports nearer to the productive West is an advantage in their favour over New York and Boston, and has furnished the ground for many of the arguments over freight differentials; but the advantage of decreased distance is offset by the absence of any easy route across the Appalachians such as is afforded by the Mohawk Valley for the east-bound traffic to New York and Boston. Of these latter two ports New York again benefits by the open valley of the Hudson River, which not only gives an easy route for the railroads but also makes the last link in the chain of water communication from as far west as Chicago, Milwaukee, and Duluth. Boston, on the other hand, otherwise most favourably located for European commerce, suffers through the presence of the Berkshire Hills, over which the railroads are obliged to ascend relatively heavy grades.

The southern Atlantic ports—Newport News, Norfolk, Savannah, and Charleston—are in varying degree hampered by the same difficulty of less ready communication with the interior. Each of the ports named lies in a region locally rich and productive, but

still relatively limited in extent by the presence of the higher hills of the Piedmont area and the Appalachian chains to the west. The southern Appalachians are also wider, in an east-west direction, than the Appalachian belt of Maryland and Pennsylvania; the ridges are higher and do not offer the advantages which Philadelphia and Baltimore possess in the lower notches of the Cumberland Gap and the transverse courses of the Ohio and Susquehanna Rivers; the high scarp of the Blue Ridge is difficult of ascent, and the higher ridges and plateau country beyond mark a region which in the absence of natural routes of travel, offers little to encourage railroad-building. The ports are therefore restricted to the tributary area of the coastal region, and are of consequently less importance.

The Gulf ports, of which New Orleans and Galveston are the chief, show not only the geographic control of location but also a control of the character of their commerce as well. New Orleans, for example, with all the great area of the central and southwest States tributary to her as a port down the natural highways of the Mississippi and its side valleys, ranks as the second export port of the country, with almost one-fourth as much in value as New York; but in the amount of imports she is far behind, with only one-twentieth as much as New York. The same condition is found at Galveston, which exports one-sixth as much as New York but imports hardly one five-hundredth as much. These conditions may be explained in great part by the fact that the two ports draw large quantities of cotton and wheat and other food stuffs from the region round about for export, while the articles of import, the necessities of life, must come by the shorter, quicker overland routes.

On the Pacific coast, San Francisco, Portland, and the Puget Sound ports are limited in the extent of their tributary area as were the southern Atlantic ports. They are the natural outlets for the entire west-going or Pacific trade of the country, but the wide, unproductive area of the American Desert, and the intervening barriers of the Rocky Mountains, the Sierras, and the Cascade Range, have necessarily restricted the extent of the area directly tributary to them. The geographical conditions, coupled with the fact that the demands of their Asiatic trade are less than those of the countries of western Europe, readily explain why the Atlantic ports are in comparison of so much more importance. With the completion of the Panama Canal it seems probable that the Pacific ports will be even less important. New Orleans and Galveston, as the natural Gulf outlets of the productive interior, must certainly

take the Pacific-going traffic of the States east of the Rocky Mountains, except, perhaps, the far northern ones, thus restricting the activities of the Pacific ports more and more to the region west of the mountains.

The greatest inland commercial centres have also been stimulated by their water traffic; they include the cities ranged along the Great Lakes, and several river cities, as St. Louis, Pittsburg, and Cincinnati. The Lake ports are interesting from the fact that their trade has often been almost entirely in the shipment of one, or perhaps two, classes of goods. Duluth and several smaller Lake Superior ports, for example, have grown up with the development of the iron mines and the shipment of ore to the mills of the eastern States. Chicago and Milwaukee are the greatest grain and flour shipping points. And the Lake Erie cities receive the products from the western lake ports and send back principally coal from the near-by Pennsylvania and Ohio fields. All of these lake ports are also railroad centres, into which converging lines act as feeders from the country round about. The importance of the lake traffic may be seen in the fact that at the time the Pennsylvania Railroad was projected the suggestion to run a line from the west to the Atlantic coast without touching the Lakes would, it was held, if carried out, mean the failure of the scheme. Up to that time every railroad between the east and the west had a lake terminus. The growth of the Lake ports is therefore due partly to the favourable conditions of water transportation, and partly to the extent of productive country acting as a feeder to their trade. The fact may be made clearer by contrasting the conditions on the American and Canadian sides of the Lakes. The one is thickly settled, with great natural resources in iron ores, agriculture and coals, with large cities and flourishing industries. The other, just as rich in ores but almost a trackless forest, has only a scanty population and a single large city, Toronto.

Of the river ports St. Louis received an important impetus from its location on the Mississippi in the days when river navigation was at its height. Pittsburg ranks as a commercial centre because of its position at the confluence of the Allegheny and Monongahela Rivers making it the natural gateway to the West. The advantage of such a location is evident from the fact that the total annual tonnage of Pittsburg's commerce exceeds that of the Suez Canal. Cincinnati, Memphis, Vicksburg, Kansas City, Dubuque, and others have in like manner been stimulated in their growth through the advantage of inland navigation.

Industrial Centres.—Many of the seaport cities which rank pre-eminently as commercial centres are also important as industrial centres, as a logical result of the fact that the mere location and established ready communication are highly favourable, not only for the supply of raw material but also for the easy marketing of the finished product both at home and abroad. New York furnishes a good example, ranking not only as the first port but also as the most important manufacturing city of the country; Chicago, the largest of the domestic commercial centres, is the second largest industrial centre, and Philadelphia, the third port, ranks third in industry. Inland commercial centres are often largely so because of their industrial importance. But there is still a class of cities which is quite distinctly industrial as the result of the geographic conditions. They separate themselves into two classes—(1) those which grow up in response to natural resources for power, and (2) those which grow up in response to proximity to raw materials. Most of the New England cities are of the first class; Birmingham, Pittsburg, and mining cities in general are of the second class.

Probably nowhere else in the country is the influence that natural power has exerted over industrial growth so marked as in the New England States. Over a region drained by several maturely-developed river systems heavy glaciation served to interrupt seriously the organized drainage, leaving in its place an abundance of waterfalls and lakes and ponds from which the rivers flowed in diverted, steepened courses. Along these courses water-power was available almost everywhere, mills were located on their banks, villages sprang up about the mills, and the present cities are the result. Massachusetts alone has more cities of over 25,000 inhabitants than any other State in the Union. Some of them, as Boston, Gloucester, and New Bedford, received their impetus from their harbours and shipping; others, as Cambridge, Newton, Malden, and Somerville, must be regarded as reflections of the growth of the "Greater Boston," but of the rest Worcester is the only important one which is not located by natural water-power. The larger manufacturing cities—Fall River, Holyoke, Lowell, and Lawrence—trace their origin and a part, at least, of their present importance to the influence of their rivers. The importance of Holyoke as a manufacturing city dates from the improvement of the power afforded by the Connecticut River, which falls sixty feet in a short distance. At present the river is crossed by a dam 1,000 feet long, giving the most valuable power in New England. At Fall River the river of the same name, the outlet of Watuppa Pond, with a fall of over 100

feet in a half mile, furnished the water-power which gave the first impetus in developing this greatest of American textile centres. Manchester, the largest city in New Hampshire, has grown up beside the famous Amoskeag Falls of the Merrimac River; Franklin utilizes the same waters higher up stream; while Nashua, Lowell, and Lawrence benefit from them farther down. The cases mentioned are but a few of the many scattered over the region from Maine southward to Long Island Sound in which the guiding influence has been the rivers and their available power.

In Pennsylvania, which ranks next to Massachusetts in the number of large cities, the contrast is marked. The streams are no less abundant, but the glaciation over the State was unimportant in its effects on the drainage. The entire southern part of the State was unglaciated, and only in the northeast and northwest corner of the State was there any approach to the condition of diverted stream-courses, lakes, and waterfalls seen in New England. Easily available power, therefore, could not be the controlling factor; it came through the maturely-developed drainage, which made possible the building of canals along the easy grades of the river valleys and the canalizing of some of the rivers themselves. In the early part of the last century the whole of the more populous part of the State was fairly well covered by the canal system. The effect of the canals can be seen in the fact that, with the exception of the ports of Philadelphia and Erie, and Chester on the Delaware River, only two of the present important cities, Lancaster and York, were not touched either by canals or canalized rivers. The cause of their growth is clearly enough in the facilities that the water transportation gave for bringing in the raw material and taking out the manufactured product before the advent of the railroad. Later on, when the railroads were introduced, the first lines parallelled the canals to a large extent, in order to share in the already-established traffic; and hence when the canals were entirely replaced by railroads the cities were not deprived of their transportation facilities.

The conditions in New York have been largely analogous to those in Pennsylvania. A great chain of important cities has grown up along the line of inland navigation which may be said to begin at Buffalo and end at New York. Rochester, Syracuse, Utica, Schenectady, Troy, and Albany complete a chain which can be equalled nowhere else in the country. Of the three other large industrial cities in the State, two—Auburn and Binghamton—have excellent water-power. The former, on the outlet of Owasco Lake, derives its power from the river, which has a fall of 160 feet in the

city limits; and the latter gets its power from the Chenango River at its junction with the north branch of the Susquehanna. The third of the cities, Elmira, not only has valuable power derived from Newtown Creek, but is also connected by the Chemung Canal to Seneca Lake and thence to the Erie Canal, and ranks as one of the most important manufacturing cities in the State.

In the western States the growth of the cities has been more recent than along the Atlantic coast. Many of the largest are located along the Lake shores and on the rivers of the Mississippi system, but most of them have been greatly helped by the rapid development and extension of the railroads. In their industrial development water-power has played little part in most cases, partly because geographic processes have made the water-power of the region slight in comparison with the east, and partly because their growth has been largely in the era of steam, to develop which many of them were readily supplied with fuel from the coal fields of Ohio, Indiana, and Illinois. Minneapolis and St. Paul are two notable exceptions. Located as they are in the heart of the grain-producing country, the immense power furnished by the celebrated Falls of St. Anthony in the Mississippi River has made them the greatest of American milling centres.

Industrial centres which have grown up in response to the presence of natural resources of raw material often present the aspect of cities where from other conditions alone no such growth could be expected. Wilkesbarre and Scranton are good examples. Before the discovery of coal and its use in the iron and steel industries the valley where the two cities now stand was a rich, fertile region devoted almost entirely to agriculture and grazing. The location of the valley between the ridges and the plateau belt of the Appalachian chain, the rugged character of the surrounding country, and the difficulty of communication with the outside world were all against the growth of a populous community. But the unlimited supply of fuel from the rich coal beds altered all this, and the populous mining and manufacturing centres are the result. Pittsburg in any case would have been a good site for a city, since its location alone at the confluence of two large rivers would make it the natural centre of traffic along their valleys. But it is certain that without the near-by coal, gas, and oil fields it would never have reached its present importance. As illustrative of this point an old tradition in the region about the mouth of the Juniata River is interesting. As the story goes, the first settler in the region, a very sagacious person, took up a strip of land commanding the junction of the

Juniata and Susquehanna Rivers, that he might profit from the city which he expected would spring up there. He also did the same thing at the junction of the Allegheny and Monongahela; but this latter tract he sold afterwards because "it was too far West." The one was in a country affording only limited agricultural resources, and is still farm land; the other is in the heart of Pittsburg.

Birmingham, Alabama, with its combination of iron ore and coal in the same region, a natural iron and steel centre; Joplin, Missouri, with its rich deposits of lead and zinc ores; Leadville and Cripple Creek, Colorado; and Butte, Montana, are the types of a large number of smaller cities and towns which have grown up solely because of the wealth of the adjacent mines.

Political Centres.—Political centres are often the direct result of geographical influences, because geography controls both distribution of population and facility of travel; and in the location of the political centre accessibility for the majority of the population is the deciding factor. Few cities, however, may be said to be purely political in character; for even though originally laid out with that purpose in view, the mere aggregation of population that must result is almost sure to attract both commercial and industrial enterprises. In the selection of political centres in the different States the control of geographical conditions is often marked. In a region with uniform surface features, and consequently more or less even distribution of population and equal facilities of travel, the political centre tends toward the geographical centre. Many of the western States are illustrative, as Columbus (Ohio), Indianapolis, Little Rock, Pierre (North Dakota), and others. But where the geographical conditions have been such as to restrict the mass of the population either permanently or for a time, little regard has been paid to the question of the geographical centre. Examples may be found among the Atlantic States where the hilly or mountainous character to the west held the people for many years to the more open, narrow strip along the coast, and where still the greater part of the population is located. Boston, Augusta (Maine), Annapolis, Richmond (Virginia), and Harrisburg (Pennsylvania) are all good examples. Farther to the south, where the coastal area is somewhat wider, the political centres are found nearer the geographical centres.

West of the Mississippi River, where climatic conditions as controlled by geography have made the region west of the 100th meridian suitable only for the support of scattered communities engaged in grazing, the mass of the population and the political centres are in the eastern part of the States. Lincoln (Nebraska) and Topeka

(Kansas) are the best examples. Montana presents another condition, with her capital in the western part of the State in the mountains, because the majority of the people are centred about the mining industry. Nevada and Wyoming ranking among the largest States in the Union have their capitals located each in the extreme corner of the State, but both are only simple responses to the location of the mass of the population. In Nevada nearly one-half the total population is found in a strip covering about 1-13th the total area of the State, near the centre of which strip the capital is located. In Wyoming about 52 per cent. of the population is located in the valley of the North Platte River in the extreme southeast corner of the State, because of the facilities for irrigation; and there the political centre is located. And, finally, in the Pacific States the segregation of the people along the coast to the west of the mountains and the interior deserts of the lava plains is reflected in the location of the State capitals—Salem (Oregon) and Olympia (Washington).

Social Centres and Health Resorts.—The cities here grouped under the head of popular or health resorts have been stimulated in their growth by geographic conditions which make them attractive to the tourist or beneficial to the invalid; in general, they are ocean, mountain, or natural spring resorts.

The attraction of the ocean resorts lies partly in the facilities for boating and bathing, but mainly in the daily occurrence of the cool sea-breeze. Newport and Atlantic City are typical. Newport is built on the southern end of Newport Island, with the ocean on three sides of the city. Much of the scenery round about is very attractive, the Cliff Walk, the Ocean Drive, and the excellent bathing beach being well known. The position of the city on the southern New England coast favours the bathing, because it is shut off by Cape Cod from the cold drift of the Labrador Current, which makes the waters of the region north of the cape so disagreeably cold. And the fact that the city is almost surrounded by water gives it a delightfully moderate climate, and is one of the important factors in making it the most exclusive resort in the country. Atlantic City, built on one of the sandy bars of the New Jersey coast, has a good beach with excellent bathing, and enjoys a climate so tempered by the ocean influence that it is frequented by many visitors in winter as well as in summer. Fogs are rare, and owing to the extensive areas of pine forest and dry sandy soil which lie inland from the coast, it is entirely free from the malaria which is so common in the low areas of other parts of the State. Atlantic

City may be regarded as one of the greatest of the American popular resorts; for although it has a permanent population of only 28,000, the transient summer population is estimated at not less than a quarter of a million. The resorts of southern California, where so many tourists seek to escape the northern winters, owe their attractions to the even more marked ocean control, which gives them a climate almost tropical in character.

Asheville and Colorado Springs are probably the best known of the mountain resorts. The former is located in the mountains of North Carolina at an elevation of 2,300 feet, with higher ridges, which shelter it on the north and east, while at a distance the ridges west of the French Broad River shut off the cold northwest winds and snows. This protection, together with the altitude, the dry soil, and the cool, invigorating atmosphere, gives it a climate especially favourable to persons suffering from pulmonary diseases. Colorado Springs is of much the same type; it is, however, at a greater elevation—6,000 feet, with a consequently rarer and more invigorating atmosphere, and, from its location at the eastern base of the Rocky Mountains, it has the dryness of an inland desert, and finally it enjoys the distinctly mountain feature of warm day or sun temperatures and cool shade or night temperatures, which are so important to invalids. Similar resorts, of lesser degree, benefiting from the effects of altitude and mountain conditions, are to be found all through the country, the White Mountains of New Hampshire and the Adirondacks of New York being, perhaps, the most important.

Widely scattered over the country there are regions in which geological and geographical forces have given natural mineral-bearing or "medicinal" springs, about which resorts have sprung up. Hot Springs, Arkansas, is the most prominent. The tradition makes them the much-desired Fountain of Youth, in the search for which Ponce de Leon lost his life and which de Soto later discovered, but too late to restore his health. The beneficial properties were certainly known to the Indians long before the advent of the white man, and from the original cluster of tepees and wigwams which they built have grown the present city and the Government Reservation, where thousands of visitors annually make use of the baths. In other sections of the country numerous resorts have grown up about springs boasting curative powers, as Hot Springs (Virginia), Cambridge Springs (Pennsylvania), Poland Springs (Maine), and others.

Summary.—The consideration of the geographical control over the location of cities and towns might be carried into much greater

detail—for example, to cover the growth of the better class of suburbs and residential districts on the higher lands about the larger cities; the location of the suburbs of manufacturing towns to the west of the factories, to escape the smoke; the beginning of many of the older New England towns on the flat areas of glacial sand plains; the location of a multitude of fishing towns at the heads of little bays; the building of mining towns in the valleys, sometimes with but a single street, or, again, built in the form of the letter T at the junction of two valleys; or towns at the gaps and passes across the mountains where travel must go. But the object here has been only to show with a few brief examples the chief geographic controls in the growth of the larger centres of population; the factors of ready communication developing commerce; natural power and raw materials stimulating industrial growth; and healthful conditions of location and climate creating popular and health resorts.

PHOTOGRAPHING WILD ANIMALS.*

The fact that 16,000 copies of this book were printed within a few months after it was sent to press indicates that the German public found in the volume, selling at about $3.00 in Germany, features commending it to unusual attention. This is true as regards both its letterpress and its illustrations. It was written by one of the most successful collectors of museum specimens of wild animal life that have ever visited Africa—a man also of attainments in biological science, if not, in all respects, of the highest authority. In its illustrations it stands alone in zoological literature, because the author is the first to use on a large scale the telescopic camera by day and flashlight by night. He shows wild animal life just as it presented itself to the camera amid natural surroundings in the forests, rivers, swamps and jungle, or on the wide plains or mountain slopes. The result is that both text and illustrations are of unusual interest, and a unique contribution to our knowledge of African wild life.

Four of the illustrations are here shown. As specimens of photography the 302 pictures are of uneven merit, many of them

* Mit Blitzlicht und Büchse. Neue Beobachtung und Erlebnisse in der wildnis in mitten der Tierwelt von Äquatorial-Ostafrika. Von C. G. Schillings. xvi and 558 pp., and 302 illustrations from photographs. (Second Edition.) R. Voigtländer, Leipzig, 1905.

being sharply defined and excellent in all respects, while others range from fair to poor. But even the poorest of these selections from about 2,000 negatives tell the truth—the characteristic facts about the animals and their environment—and this was Schillings's purpose in presenting them. He permitted the negative of only one picture in the collection to be retouched. He would have defeated his own purpose if, in order to make some of his pictures

RHINOCEROSES IN A SWAMP.

more pleasing, he had subjected them to the manipulation of an artist. It is quite safe to say that no other photographer will soon have occasion, like Schillings, to excuse the rather hazy outlines of a lion he has photographed on the ground that as he sat behind his thorn fence the animal was within ten feet of his camera—too near for a sharp definition of it.

Schillings's work in Africa was well known to his countrymen before he added the camera to his equipment on his last collecting journey in 1903–04. As the results of his three extended tours in German East Africa and the British East Africa Protectorate he has brought home a considerable number of live specimens of the big game, such as giraffes, buffaloes, rhinoceroses, elephants, and the larger antelopes, besides skins, skeletons, etc., mounting into the thousands. He has received unstinted praise for the skill and care with which he has preserved and prepared this immense amount of material so as to adapt it thoroughly for museum purposes. His collections made in 1899–1900, 1902 and 1903–04 are distributed among the zoological museums of Berlin, Stuttgart, Munich, Vienna, Frankfort-on-Main, Weimar, and Karlsruhe. He has discovered a new mouse, and new varieties of three other species: the giraffe, the hyena, and the mountain antelope, to which scientific men have given the names *Giraffa Schillingsi*, *Hyaena Schillingsi* and *Oreotragus Schillingsi*.

Impressed on his first two expeditions with the belief that most of the pictures of wild animals in popular books and text-books are more or less untrue to nature, because made chiefly from specimens in the zoological gardens or mounted in museums, he took a thorough course in field photography before his third journey, and carried to Africa a very complete equipment of cameras and other photographic material. He gave the larger part of his time during his last year and a half in tropical Africa to making this large collection of negatives.

African explorers are commenting on the truth which these illustrations seem to reveal of some of the types of topographic forms and scenery among which the animals are scattered in troops or singly. One traveller, for example, says that he has never before seen so faithful a reproduction of the real aspects of the east African plains, with their varieties of surface, their high grass, scattered trees and scrub, and the zebras, gnus, antelopes, and many other animals in their various attitudes—now peacefully grazing, now aroused to a sense of danger, here resting in the shade, there galloping over the plains, or quietly, in single file, following the paths to the drinking-places.

To mention the story that some of the telescopic photographs tell: We see the ostrich eggs hatching under the hot sun, with the mother bird on guard; elephants browsing in the thickets, and the destruction they have wrought by tearing down small trees to get at their tender twigs and leaves at the top; the bird life of the

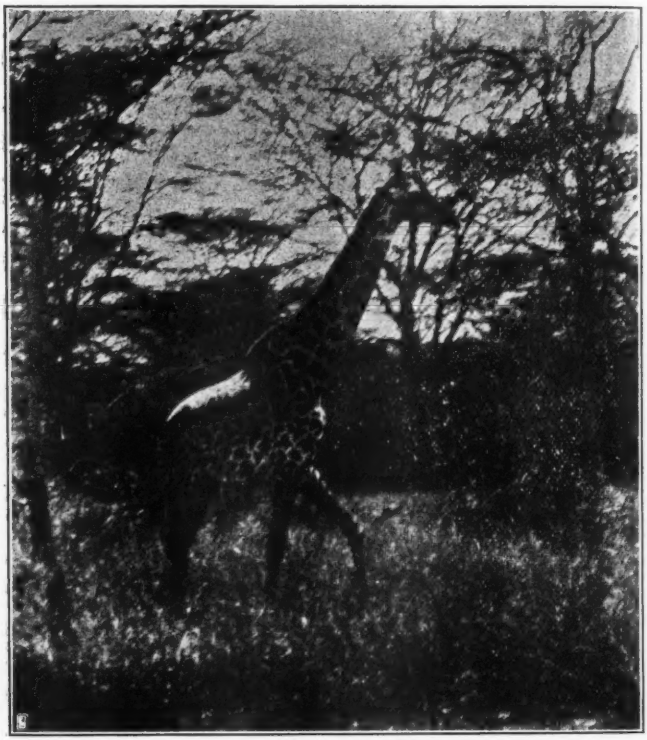
swamps; flocks pluming themselves just before starting from the neighbourhood of the equator for their winter resorts on the Mediterranean shores of Europe; rhinoceroses taking their bath or resting in the shade under the noonday sun; a hippopotamus swimming in a river; a troop of monkeys on the plain (for some monkeys are not wholly arboreal); zebras under many conditions of their lives, and the wonderful mimicry of nature, displayed in the

DWARF GAZELLES (FLASH LIGHT).

stripes and spots of some animals, making it difficult to discern them amid the vegetation that environs them.

The night vigils of the photographer were numerous and long. His camera was usually erected at the drinking-places or the paths leading to them, and here most of his remarkable pictures of lions, leopards, and other beasts of prey were taken. Sometimes he tied

to a stake or tree a donkey or steer from his camp as a tempting bait for lions; but, he says, in every instance the poor victim had been infected with the poisonous bite of the tsetse fly, and was doomed to die after lingering a few weeks in great suffering, while the death that the lion or leopard inflicts is practically instantaneous. He says that the lion springs upon the neck of his victim, and with one bite severs the vertebræ, causing instant



THE GIRAFFE.

and painless death. The long waits for photographic subjects were sometimes very trying, but Schillings says there was very little danger. All animals, from the king of beasts to the timid gazelle, were simply overcome with terror when the dazzling light flashed. They made off into the jungle at top speed. Of two flashlights taken in quick succession, one shows a lion

crouching for a spring, and the other the end of his tail as he leaves the scene.

The letterpress was written from the fulness of the author's

ZEBRAS AND GNUS. OFTEN SEEN TOGETHER AND FRIENDLY.

long experience, his love of the animal kingdom, and his exceptional aptitude for the study of it. He says it was far easier to

endure those weary watches in the jungle from dusk to the short twilight of morning than to write his book, but there is no suggestion of effort in the interesting pages in which he tells of the life and habits of many African animals as he has studied them year after year in their native wilds. He believes all the big game animals, as well as the beasts of prey, are doomed to destruction. The game laws have diminished the slaughter by European Nimrods, but it still goes on almost without abatement at the hands of native caravans and tribes, now armed with flint-locks, in wide regions that are still only nominally under the control of colonial law.

The book concludes with lists of the mammalia and other animals collected in Africa by this untiring and enthusiastic naturalist. They include 470 species and varieties. Schillings's book is one of the most conspicuous contributions to African literature in recent years.

PEARY ARCTIC CLUB EXPEDITION, SUMMER OF 1905.

The Peary Arctic Club Steamer *Roosevelt* steamed away from the pier at North Sydney at 2 P. M. of Wednesday, July 26th. Some 43 tons of coal in bags were carried on the quarter deck to balance the weight of coal in the hold, and to keep her stern down. With this exception the decks were unusually clear as compared with previous expeditions. A few miscellaneous casks filled with water and the cases of oil were practically everything not under cover. The *Roosevelt* carried in all something over 500 tons of coal, in addition to supplies and equipment. In carrying capacity she comes fully up to my expectations. A quarter of beef in the rigging, and half a dozen live sheep on the deck aft, insure us a fresh meat supply until we strike the Arctic game. There is a large tank and several casks full of water on deck, besides the full tanks below. I hope to make no stops before reaching Cape York. The season is late and every day is precious.

In the evening we ran into dense fog through which we ploughed our way across Cabot Strait, the southern gateway of the Gulf, blowing our whistle as if in Long Island Sound, for we were crossing the track of all inward and outward bound traffic. During the night we drove through several thunder storms, with electrical accompaniments as vivid as in the Gulf Stream storms. During the following day we passed Cape Anguille and Red Island, the bold cliffs of St. George on the Newfoundland west coast.

We reached the southern entrance of Belle Isle Strait Friday evening, the fog shutting down on us and giving us a very dirty night through this graveyard of ships.

Point Amour Light was invisible until apparently hanging over our mast head, and then we felt our way along from fog horn to fog horn. We could hear two or three large steamers blowing their double blasts to show that they were lying to, and the numbers of icebergs added to the uncertainty and anxiety of the passage.

At breakfast time, just north of Chateau Bay, we ran out of the wall of fog into sunshine and a field of glistening icebergs.

From here we ran north just off the Labrador coast in alternate fog and sunshine to Domino Run, where the coast trends northwestward. Here I sent letters ashore, and learned that the ice was along the Labrador coast as far as Cape Harrigan.

Leaving Domino Run we entered the fog again, and the course was set northeast by east to bring us to the Greenland coast well up Davis Strait. We passed very close to several bergs until the following morning, when we were through them, the sea very smooth and the fog continuing. At noon of August 1st we were in the latitude of Cape Farewell and Cape Chidley, and about midway between them.

At 2 P. M. on the 3d an opening in the fog showed us the Sukkertoppen Islands on the starboard bow. We are now past the east coast ice without seeing a cake of it, and have had a very smooth passage across the Strait, with fog, light wind, and smooth sea.

On the 4th we crossed the Arctic Circle soon after midnight, and later steamed out of the fog into the true North Greenland summer weather, bright sunshine, dark blue sea, and the bold Greenland coast stretching north and south on the starboard hand. Not a piece of ice in shore of us, nor a berg in sight in any direction. Still later in the day we passed into a magnificent fleet of bergs, the output of Disco Bay. A little after midnight the morning of the 5th we passed Godhavn, the capital of North Greenland. Off Hare Island we passed through another fleet of bergs, the contribution of Umanak Sound to the Arctic White Squadron.

Early in the morning of the 6th we passed Sanderson's Hope, seen and named by John Davis three hundred years ago, its base just visible under the fog. From here on until midnight we had the first wind with any push to it, fresh from the southwest, true, and bringing up a sea which would have made the *Roosevelt* a bit lively had it not been for her sails, all of which were set and drawing.

Occasionally the top of a wave slopped over the port rail, but not sufficiently to cause any discomfort.

At 6 P. M. we passed the Duck Islands on our starboard beam, near enough to see with the glasses the old Whaler's Lookout on the summit. The sea and fresh breeze continued until after midnight, and every indication pointed to the existence of very unpleasant weather behind us, which we were just running ahead of.

During the night of the 6th to the 7th we crossed Melville Bay, and at 2 P. M. Cape York was visible ahead of us. At 7 P. M. we steamed past the point of the Cape, heading for the Eskimo settlement beyond. The run from the Duck Islands to Cape York was made in 25 hours without encountering fog, and without a sign of ice or ice sky.

We are now twelve days out from Sydney, and in regard to smoothness of sea, peacefulness of weather, entire absence of ice, and the scarcity of bergs, the voyage from Sydney to Cape York has been most unusual even for this season of the year.

Landing at the familiar settlement, I found four tents, and learned from the natives here that some fifteen families were located to the eastward, some on the island on the east side of Cape York Bay, and others on Meteorite Island. Among these were some of the best men of my last expedition. I told the natives to get their things ready to come on board on my return, went off to the *Roosevelt*, and steaming around the fringing barriers of grounded icebergs, which in summer invariably lie on the eastern side of the Cape, we headed eastward into Melville Bay.

Stopping off at the first settlement I told the men who paddled out to us in their kayaks like a bevy of ducks to get their things ready to move as soon as the ship came back, and then went on to Meteorite Island. On the south side of this I found four tents, three of them occupied by a tribe of men of my last expedition. When our mutual explanations of pleasure at meeting again were over, I learned from them that four other families were still deeper in the Bay, at Naglokto. Two of these are good men; but I shall not see them, as I cannot spend the time to go so far out of our way.

In an hour or two the entire population of Meteorite Island, with their dogs and all their belongings, were on board, and the *Roosevelt* headed westward again, leaving the place deserted.

At the next settlement the operation was repeated. Six families moved their tents, dogs, sledges, and all their belongings on board, and deserted their village in about three hours.

It was after breakfast when we finished at this place, and every one had been up all night.

At Cape York three men and their entire outfit were taken on board, leaving one old man with his wife and two children to hold the fort at this end of Eskimo land, and at two in the afternoon of the 8th the *Roosevelt* steamed around the Cape and headed north to join the *Erik* at North Star Bay. While passing Petowik Glacier we saw the most unusual sight, in these waters, of a steamer passing south to the westward of us. The glasses showed her to be a small schooner-rigged, yacht-like vessel. Arriving at North Star Bay soon after midnight the morning of the 9th, we learned that she was the Danish steamship *Fox*, which has been reconnoitring north of Cape York for the purpose of selecting a site for a station.

Here I transferred to the *Erik* with Marvin and Henson to make a round of the Eskimo settlements to the north with her and to hunt walrus, while the *Roosevelt* goes direct to Etah to overhaul her machinery and get ready for fighting ice. Soon after the departure of the *Roosevelt* the *Erik* got under way, and made the circuit of Wolstenholme Sound looking for walrus, but, in the absence of any ice for them to crawl out upon, we saw none. A few hours were then spent at the Saunder's Island bird cliffs, obtaining about 130 birds, and the *Erik* steamed back to North Star Bay, where I took on such of the natives as I wanted, with some thirty dogs purchased from the natives remaining, and the *Erik* steamed north for Whale Sound before midnight.

The next morning we were rounding magnificent Cape Parry into Whale Sound, and steamed eastward along the southern shore to Itabloo, where I expected to find more of my people. None were here, however, and the *Erik* turned northward across the sound to Karnah, where I felt certain to find some one. Six tents were located here beside the brawling summer river, and the men were all away to Cape Cleveland with one of the whaleboats which I gave them three years ago, hunting walrus. From the women I learned that about ten families were up the gulf at Kangerdlooksoah and that vicinity. Telling the natives here, as at the other places, to get their things in readiness to come on board when the ship returned, we steamed eastward into Inglefield Gulf. No ice was to be seen here, but there was a most unusual profusion of bergs from the great Heilprin and Melville Glaciers at the head of the Gulf. At times it looked as if there was no thoroughfare among the bergs, but a closer approach in every case showed winding pas-

sages among them, and off Kangerdlooksoah there were comparatively few.

Here, where I left my faithful people three years ago, I found now six tents, the occupants of all but one of them young and active men. The number of dogs and the goodly supply of skins which these people had, made the process of moving a little slower than at some of the other places, but everybody and everything was finally on board, leaving the place deserted which a few hours before had been enlivened by the voices of children and the barking of dogs. From Kangerdlooksoah we steamed north across the head of the gulf to Harvard Islands, on the northernmost of which were four tents. These, like the others, were embarked as soon as possible, and at half past two on the morning of the 11th the *Erik* was ready to steam down the gulf again.

The scene and the surroundings during this typical Arctic summer night were such as to be long remembered. The surface of the gulf like a placid mirror, thickly dotted in every direction with fragments of ice and icebergs of all sizes and shapes, and flanked on the east and north by the gigantic amphitheatre of the Heilprin, Tracy, and Melville Glaciers rising to the steel-blue slopes of the great ice, while northwest and west rose the warm, red-brown bluffs of Mount Daly and Adams and Josephine Peary Island, and to the south the rolling slopes of the Kangerdlooksoah deer pastures. During the remainder of the night we steamed down the gulf, and in the forenoon we were up on the walrus grounds, between Herbert Island and the north shore of the Sound.

Up to this time the weather, since arriving at Cape York, has been an uninterrupted sequence of calm and continuous sunlight, typical Arctic summer weather. Now, however, wind and fog have their turn, and, rendering it impossible to secure walrus, wasted the day for us.

In the evening we steamed back to Karnah to take on board the natives there and be in readiness to attempt the walrus again the following day. By midnight this work was completed, and as everyone was now dead tired and sleepy, the *Erik* steamed out into the middle of the Sound to drift until after breakfast of the following day, when we again steamed out to the walrus grounds, and by 9 o'clock at night had secured eighteen of the animals. Fog and rain were now coming in upon us, and we steamed into the last settlement on our list, Igludiahni, where six huts were found. Our stay was short, as I wanted but one family here, and it did not take me long to purchase a number of additional dogs.

When the last dog was on board, the *Erik* headed for Cape Chalon on her way to rejoin the *Roosevelt* at Etah, where she arrived at breakfast time Sunday, the 13th. The *Roosevelt* had landed her coal in bags, and the supplies had been broken out and reloaded in order to give her the proper trim to enter the ice.

It being Sunday, everybody enjoyed a much-needed rest, except the Eskimos, to whom the work of skinning and cutting up the walrus was a labor of love and pleasure.

Early Monday morning the *Erik* veered alongside the *Roosevelt*, and at 5 o'clock the work of transferring the meat, of re-storing the *Roosevelt's* supplies, and of filling her bunkers and between-deck space with coal from the *Erik* was commenced. This continued during Monday, Tuesday, and Wednesday, when the *Roosevelt* was ready to steam out and begin the struggle for which she was built, the fight with the Arctic ice from Cape Sabine to the northern shore of Grant Land. Thus far the voyage has been child's play; what is now before her is likely to be the reverse.

The *Roosevelt* has on board a crew of 20, some 40 Eskimos, and about 200 dogs. She also carries, in addition to the supplies and equipment for the party, some 450 tons of coal and several tons of walrus meat.

I have been agreeably surprised to find the natives in an unusually prosperous condition, with a superfluity of dogs, abundance of meat, and a good supply of skins for clothing. Several of my old friends and acquaintances have died during the last three years, but there are also a number of new babies, and although I have not had time for anything in the nature of a census, I have no doubt the number of births equals and probably exceeds the number of deaths. Temperature observations of air and sea water, and barograph and thermograph sheets since leaving Belle Isle are appended. These are not as continuous as might be desired, owing to the interruptions from the demands of imperative work; but they are sufficient, perhaps, to give an idea of the weather conditions thus far.

R. E. Peary, U.S.N.

Etah, North Greenland,*
August 16, 1905.

*Mr. Peary's report was received September 18. The latest news brought back by the *Eric* was very encouraging. A few hours after the *Roosevelt* started for the entrance to Smith Sound it was apparent that leads in the ice were opening to the north. On the following day the vessel had passed out of sight, no smoke was to be seen, and it was evident that the openings in the ice had enabled the explorer to push into Smith Sound, and that he was making the most of the opportunity to get north as fast as the conditions would permit.

BAROMETRIC AND THERMOMETRIC READINGS, FROM SYDNEY, C. B., TO ETAH, N. GREENLAND.

Ross C. Marvin, *Observer.*

	Sea Water.	Maximum for 24 hours previous.	Minimum for 24 hours previous.	Hygrometer		Spirit Thermometer.	Barometer.	Attached Thermometer.	Commander's Barometer.	Attached Thermometer.
				Wet Bulb.	Dry Bulb.					
July 27, 9 P.M.							30.02	69		
July 28, 7 A.M.							30.02	75	30.04	70
Noon	56.5						30.05	75		
2 P.M.							30.04	76		
9 P.M.							30.02	71		
July 29, 7 A.M.							30.00	64		
Noon	40.5						29.97	65	29.96	67
2 P.M.							29.98	66		
9 P.M.							29.99	64		
July 30, 7 A.M.							30.02	64		
Noon	43.5						30.05	68	30.06	70
2 P.M.							30.05	68		
9 P.M.				70.0	70.5		30.06	65		
July 31, 7 A.M.				65.0	65.5		30.05	64		
Noon	48.0						30.06	67	30.08	72
2 P.M.				45.5	45.5	46.	30.07	64		
9 P.M.		56.	42.	44.0	44.0	44.5	30.09	60		
Aug. 1, 7 A.M.				52.5	52.5	53.	30.12	71		
Noon	47.			46.5	47.	46.	30.12	61	30.14	69.
2 P.M.				47.	47.	47.	30.13	64		
9 P.M.				43.5	44.	44.5	30.15	60		
Aug. 2, 7 A.M.		53.	38.5	45.	45.5	45.	30.21	70		
Noon	47.			47.5	47.5	48.	30.24	78	30.20	67
2 P.M.				47.5	48.	48.	30.23	79		
9 P.M.				45.5	46.	45.5	30.18	79		
Aug. 3, 7 A.M.		51.	35.5	45.	45.5	46.	30.13	82		
Noon	43.			47.5	47.5	46.5	30.07	73	30.03	64
2 P.M.				48.	48.	48.	30.06	72		
9 P.M.				40.5	40.5	40.	30.01	71		
Aug. 4, 7 A.M.		50.5	35.5	47.	47.	45.5	30.01	78		
Noon	41.			45.5	46.	45.5	30.05	84	29.99	66
2 P.M.				43.	43.	42.	30.04	81		
9 P.M.				42.5	42.5	42.	30.05	87		
Aug. 5, 7 A.M.		51.	29.5	48.	48.	47.5	30.02	67		
Noon	41.			42.	42.	41.	29.98	56	29.99	65
2 P.M.				44.5	44.5	41.5	30.03	65		
9 P.M.				42.5	43.	41.5	30.18	82		
Aug. 6, 7 A.M.		51.5	37.5	42.	42.5	41.5	30.25	77		
Noon	41.5			42.	42.5	41.5	30.20	61	30.19	62
2 P.M.				42.	42.	41.	30.26	78		
9 P.M.				47.	47.5	46.5	30.22	58		
Aug. 7, 7 A.M.		46.	24.	39.5	39.5	39.	30.22	69		
Noon	40.5			42.	42.	41.	30.15	66	30.14	62
2 P.M.				40.5	40.5	40.	30.14	72		
9 P.M.				37.	37.	36.5	30.02	67		
Aug. 8, 7 A.M.		46.	32.	42.	42.5	42.5	30.05	71		
Noon	36.			40.	41.	41.5	30.12	73	30.10	65
2 P.M.				40.5	40.5	39.5	30.12	72		
9 P.M.				38.5	39.	38.5	30.11	80		
Aug. 9, 7 A.M.		49.5	34.5	41.5	42.	40.5	29 76	75		
Aug. 13, Noon	37.	58.	33.	39.5	40.	39.	29 93	62	29.92	60
2 P.M.				39.5	39.5	38.	29.94	64		
9 P.M.				38.	38.	37.5	29.95	70		
Aug. 14, 7 A.M.		45.5	37.	38.5	39.	38.	29.98	67		
Noon	37.			30.	39.	39.	30.00	71	29.96	58
2 P.M.				40.	40.5	40.	30.04	76		
9 P.M.				38.5	39.	38.5	29 06	66		
Aug 15, 7 A.M.		45.5	32.5	37.	37.5	37.	29.82	65		
Noon	37.5			41.5	42.	41.5	29.80	66	29.79	59
2 P.M.				41.	41.5	41.	29.80	69		
9 P.M.				40.	40.	39.5	29.79	61		
Aug. 16, 7 A.M.		47.	37.	42.5	43.	43.	29.88	73		
Noon	37.5			37.5	37.5	37.	29.88	68	29.89	66
2 P.M.				38.	38.	38.	29.89	66		

GEOGRAPHICAL RECORD.

AFRICA.

IRRIGATION IN CAPE COLONY.—The Director of Irrigation in the Cape of Good Hope Government made a journey through a part of the semi-arid northwestern districts of the colony in June and July, last year, and has sent the printed results of his inquiry to the Society. The problem is to make the best utilization of the waters to fertilize parts of this dry region. The journey was chiefly in the eastern half of the region between the Cape railroad to Kimberley and the Orange River. The available water will suffice to irrigate only a small part of the total area, but in the aggregate a great deal of land may be reclaimed to the highest fertility. The Brak River, for example, may be diverted over 5,000 acres of excellent land on Tigerpoort Vlei. The long stretch of islands in the Orange River between Upington and the Augrabies Falls comprise a large area of very fertile soil and offer the best prospect of utilizing the waters of the river on an extensive scale. In many of the smaller valleys the stock farmers may grow sufficient fruit, vegetables, and grain for their families and hired help by building dams or sinking wells. The Doorn River may be utilized to irrigate about 5,000 acres. The irrigation projects in Cape Colony are an interesting feature of the movement in many parts of the world to reclaim as large a portion of the arid regions as the water resources will permit.

SURVEYS IN UGANDA.—Lieutenant-Colonel J. H. Sadler recently read a paper before the Royal Colonial Institute (*Proc.*, 1904-5), in which he said that the work of preparing an accurate map of Uganda and of definitely fixing the areas of the estates allotted to the chiefs and landholders is being carried on by a Survey Department that has been raised to a complement of twelve English and nine Indian surveyors. Up to the end of March, last year, 7,000 square miles had been prepared by plane tabling for main and secondary triangulation; observations with the 10-inch theodolite had been taken over an area of 2,465 square miles, and 450 square miles had been mapped on the 1-inch scale.

NILE BASIN RAINS.—Captain H. G. Lyons, Director-General of the Survey Department of Egypt, has recently published a report on *The Rains of the Nile Basin in 1904* (Cairo, 1905. 8vo. Pp. 25), in which the results obtained at more than forty rainfall stations are discussed. Five years ago there were only six or eight places in the Nile basin where regular observations of rainfall were made. Thirty-two of the present stations are south of Berber (lat. 18° N.). Yet, with all this increase in the available material, there is still much that is not understood as regards the conditions which govern the rainfall of the Nile Basin, and as regards the relation between the rainfall in different parts of the basin. The seasonal variation of the rainfall depends, in the Nile Basin, upon the migration of the equatorial belt of low pressure, clouds and rain, and upon the conditions of the northeast and southeast trade winds. These winds, non-rainy when blowing horizontally, may give heavy precipitation when forced to rise over mountains. The maximum rainfall season is in summer, when the low-pressure belt is north. The winter rains, from November to February, do not affect the Nile supply, being purely local in their effects. They occur on the Red Sea hills, outside of the Nile

Basin, and on the Mediterranean coast; but these latter rains are mainly of importance for the crops raised on the coast west of Alexandria. The northern stations have a single rainy season, while the equatorial stations have two rainy seasons and two dry seasons. The line of demarcation between these two seems to be somewhat north of Wadelai. There are also signs of it in the observations at Nimule and Gondokoro. The rainfall in these districts falls characteristically in heavy downpours, usually as a thunderstorm, so that places near together may have annual rainfalls which differ greatly in amount. An analysis of the rainfall data for the past year shows that the rains of 1904 were generally below the mean. There was some improvement in the conditions in Abyssinia in July, but there followed a large deficiency in August, which seriously affected the volume of the Nile flood. No more favourable conditions followed, and therefore the low stage of the river was lower than usual. The high mean level of the equatorial lakes was maintained chiefly because of the fact that the meteorological conditions of July and August were less favourable than usual to evaporation. The rainfall in that district, which was somewhat deficient in the early part of the year, was above the mean in the autumn.

Captain Lyons, whose investigations in connection with the climatology of Egypt and of the Nile Basin are noteworthy, has further recently communicated to the Royal Society the results of an inquiry into the relation of the Nile flood to the variations of pressure in northeastern Africa (*Proc. Roy Soc.*, Vol. A76, 1905, pp. 66-86). He finds that the curve of the Nile flood varies inversely as the mean pressure of the summer. High and low pressures accompany low and high floods respectively. The pressure variations are generally of the Lockyer "Indian type" or the Bigelow "direct type." Pressure above or below the normal in the rainy months of Abyssinia coincides closely with deficiency or excess of rainfall. Between 1869 and 1903, on this basis, an accurate forecast of the flood could have been made from month to month in six years out of seven. On the same basis, Captain Lyons says:

> With weak summer rains and high-pressure conditions in September and the first part of October no large amount of water can have been stored up in the soil of Abyssinia, so that the springs will run off early, and a very low stage may be expected in 1905.

R. DEC. W.

FARMING IN BRITISH EAST AFRICA.—Two years ago there were only six European farmers in the British East Africa Protectorate, but, according to the latest official reports (*Africa*, No. 4, 1905), they now number about 600. The Director of Agriculture is continuing his experiments on the Nairobi and Naivasha farms, and his report is illustrated by photographs showing the work on these farms. The greater rains occur from March to May, when grain is sown, and crops ripen in the dry months from June to October. The typically tropical region, a coast-belt 100 miles wide, hitherto neglected on account of its climate, is now receiving attention, and about 100 acres are planted with cotton, which should yield 300 to 400 pounds of lint to the acre. There are excellent opportunities for fruit farms and dairying in the neighbourhood of the port of Mombasa. There is important development in the central districts from 100 to 250 miles inland, where settlers from the East Indies are making much progress, and their cotton crop is estimated to yield about 1,400 pounds to the acre. Many Europeans have settled in the lake district, where the fertility of the soil and abundance of rain afford excellent agricultural opportunities. The development of farming is proceeding at a fair pace in the best parts of the Protectorate, though not yet well represented in the exports.

SIR HARRY JOHNSTON'S OBSERVATIONS IN LIBERIA.—This African explorer made his third visit to the coast of Liberia in 1904, his earlier sojourns in that country having been in 1882 and 1885. In a paper describing his visit (*Geog. Jour.*, Aug., 1905) he says that in many places the heavy forest which grew down to the sea in 1882 has been cleared away to make room for plantations or settlements. He estimates that of the 45,000 square miles believed to be approximately the area of Liberia, 25,000 square miles are dense forest; about 15,000 square miles are the interior grass or park lands, occupied chiefly by the Mandingo cattle-raisers; about 3,500 square miles are covered with the plantations, gardens, and settlements of the Americo-Liberians along the coast; and 2,000 square miles or so are clearings made by the indigenous natives along the coast.

Rubber, he believes, is destined to be the great export product of the future, though the development thus far is very small. The wealth of the forest in rubber-yielding trees, vines, and bushes is unequalled in any other part of Africa, excepting, perhaps, in one or two small areas of the Congo Basin. There appear to be at least twenty-two trees, plants, and vines producing salable rubber, including the widespread *Landolphia owariensis* (the largest rubber resource in the Congo State), and the enormous rubber tree, *Funtumia elastica,* once so abundant in the Lagos Colony. The park-like country of hills, mountains, and grass-lands beyond the forest region is inhabited by a more or less Mohammedanized people, who genuinely, but not fanatically, adhere to Mohammedan principles. The spread of Mohammedanism in Northern and Western Liberia has been of great benefit to the country, diminishing the traffic in alcohol and checking drunkenness.

Sir Henry estimates the number of Americo-Liberians at only about 12,000; while the indigenous natives are supposed to number about 2,000,000. The immigrants from America have not, as a rule, withstood the climate much better than Europeans, and few of them have reared large families of children; but the later generation, born in the country, is taking hold of the work of development more efficiently, and this is partly due to the increasing practice—which he believes is sensible—of intermarriage with women of the fine, vigorous, indigenous races.

Americo-Liberian settlements are scattered quite thickly along all the lower part of the St. Paul's River, and some of them have a distinctly prosperous and prepossessing appearance. The part of Monrovia inhabited by the Americo-Liberians is composed of broad, grass-grown streets and substantial, well-built, comely-looking houses, churches, offices, and public buildings. The smart appearance of the houses contrasts strikingly with the neglected appearance of the roads, which were never made, but are simply unlevelled rock of more or less flat surface. He thinks the leading characteristics of the Americo-Liberians are their love of building and their remarkable politeness.

There is a good deal of civilization, with comfort and indications of progress, at the settlements that are grouped under the general name of Grand Basá, and also at the Sinó towns, the most important of which is Greenville:

> But perhaps, on the whole, the most go-ahead and energetic assemblage of Americo-Liberians is to be found at Harper (Cape Palmas). Here is a philosophical society which is doing a good work in collecting and printing statistics about Liberia. But Harper, unfortunately for Europeans, is a good deal more unhealthy than Monrovia.

Sir Harry says that the country is uncommonly free from the ordinary insect pests of Africa. There is apparently no Glossina fly to spread the tsetse disease. There are very few mosquitoes, and they seem to be entirely absent from much of the forest region. White ants are not very common or destructive in the centres of population.

There has been a marked advance in recent years in the good relations between the American settlers and their native subjects. The tribal chiefs assemble from time to time at Monrovia to confer with the authorities, and there is now no cause of dissension among them. One result of this mild rule of black by black is that the white man is everywhere received with great friendliness, because he is not associated in the minds of the natives with conquest or oppression.

AMERICA.

THE MINING AND QUARRY INDUSTRY OF NEW YORK STATE.—A report on this subject has been prepared by Assistant State Geologist Newland, and is issued as "Bulletin 93" by the New York State Museum. It presents a summary of the mineral resources of the State and their economic development. The value of the mineral production of New York in 1904 was $27,766,905, and about 10,000 workings (mines, quarries, and wells) contributed to the output. The items of largest value were: Building brick, $7,473,122; other clay products, $2,592,948; salt, $2,102,748; limestone, $2,058,405; sandstone, $1,896,697; petroleum, $1,709,770; mineral waters, $1,600,000; pottery, $1,438,634; iron ore, $1,328,894; Portland cement, $1,245,778; and natural rock cement, $1,207,883. All the various industries are described, and a full index facilitates reference. The Economic and Geologic Map of the State, issued as part of Museum Bulletin 15, and also in the 48th Museum Report, will be found useful in connection with this valuable compendium.

NEW YORK HARBOUR IMPROVEMENT.—Only a little over two of the eight miles authorized by Act of Congress to be dredged in the East or Ambrose Channel have thus far been completed. It is intended by the deepening and widening of this channel to provide an entrance to the harbour 2,000 feet wide and 40 feet deep, and to shorten the present route by nearly five miles from the bar.

THE MINERAL WEALTH OF INDIANA.—The 29th Annual *Report* of the Department of Geology and Natural resources of Indiana is a volume of 888 pp., chiefly devoted to the discussion of the mineral resources and industries of the State. The value of the output of these resources has steadily increased in the past decade, for, although the State has none of the metals, the variety and value of its useful minerals are very large. The six leading mineral resources are coal, petroleum, natural gas, building stone, clay products, and Portland cement, and the increase in their value in the past decade has been $19,257,939, or 115 per cent. Adding to the value of these resources the output of hydraulic cement, lime, whetstones and grindstones, sand and lime brick, artificial stone, moulding and glass sands, and other minor natural resources, the total value of the annual output foots up $40,000,000 or more.

A quarter of a century ago Indiana was noted chiefly for her crops of maize and wheat, her droves of cattle and hogs, and her bluegrass pastures and timberlands, a fact that makes the present development of her mineral resources all the more remarkable. The larger part of the *Report* is devoted to the clays and clay industries of the State. Shale was unknown among the natural resources a dozen years ago, and the great beds of soft, thin-layered rock which occur in vast areas in the coal counties were looked upon as a nuisance that had to be removed or tunnelled through before the coal could be reached. To-day hundreds of kilns are burning these shales into sewer-pipe, conduits, paving brick, drain tile, and other articles. The *Report* gives the location, thickness, and area of the most valuable

clay deposits, indicates their fitness for the manufacture of various products, describes methods of manufacture, and gives the statistics of the various industries. There are also special reports on the natural gas and petroleum industries.

HARVARD TRAVELLERS' CLUB.—This club was organized in Boston in 1902 for the purpose of promoting intelligent travel and exploration. Professor William M. Davis is the President. The Council Report issued in May last said that the total membership was 172, an increase of 45 during the past year. It has been voted to establish a Club medal, to be given annually to the North American traveller who shall be deemed most worthy of this distinction. Regular meetings are held in Boston and Cambridge on the last Friday of the month, from October to April, excepting December.

SOME UNITED STATES MINERAL STATISTICS FOR 1904.—The value of the clay products of the United States in 1904, as reported to the United States Geological Survey, amounted to $131,023,248. Of common brick 8,665,171 thousands, valued at $51,768,558, were produced. The value of all brick and tile produced was $105,864,978, or 80.80 per cent. of the value of all the clay products. The value of the pottery was $25,158,270, or 19.20 per cent.

The total amount of coke produced was 23,621,520 short tons, valued at $46,026,183.

The salt industry yielded 22,030,002 barrels, valued at $6,021,222.

The production of crude petroleum in the United States was 117,063,421 barrels, valued at $101,170,466.

DR. ALEJANDRO RUIZ CADALSO, Professor of Geodesy and Topography in the School of Engineers and Architects in the National University of Cuba, sends a copy of his address on *The Map of Cuba,* delivered in April last.

Dr. Cadalso declares that there is no scientifically accurate map of Cuba in existence, because there has been no trigonometrical survey of the island and no comparative survey of its elevations. He describes the methods and the operations required for such surveys, and he looks forward to the day when a body of engineers trained in the School of the University shall produce the map of the Republic.

Older countries than Cuba have yet to wait for a map.

HYDRAULIC POWER FROM ANDEAN WATERS.—Mr. C. Reginald Enock is quoted by the *Bulletin* of the Bureau of American Republics (July, 1905, p. 132) concerning the undeveloped water-power in Peru on both the eastern and western slopes of the Andes. The source of this perennial water supply, he says,

> is the ice-cap above the line of perpetual snow . . . and the exceedingly heavy snow and rain storms of the high plateaus. All along this vast chain, from Ecuador to Chile, is a series of lakes, practically astride the summit of the Andes at altitudes from 12,000 to 17,000 feet above sea-level, and these lakes, with the streams to which they give rise, are the source of enormous hydraulic energy.

Thus the River Rimac, rising at an elevation of over 17,000 feet and reaching the coast at Callao only eighty miles from its starting-point, generates electricity for the railroad between Callao and Lima, and could supply constant and unlimited power over every part of its course. Similar facilities, still unutilized, are provided by many other streams all along the 1,500 miles of the Peruvian littoral.

METEOROLOGY IN MEXICO.—Señor Pastrana, Director of the Central Meteorologic-Magnetic Observatory of Mexico, prepared a monograph for the St. Louis Exposition descriptive of the meteorological work of that Republic. Although the

Central Observatory has been in existence for twenty-six years, the general meteorological service is only now being established. It is making rapid progress, and the work of the various States is being supplemented by many private persons, who are establishing observatories and stations at their own expense. The pamphlet outlines the work of the weather map and prediction service and of each of the observatories, and is accompanied by a map showing the distribution of observatories and stations, all of which, besides recording the usual weather data, are expected to observe electric, seismic, and vulcanological phenomena and river floods.

THE MEASUREMENT OF A DEGREE IN ECUADOR.—The French Committee in charge of the scientific features of the measurement of a degree in Ecuador has reported to the Academy of Sciences (C. R., Vol. 140, p. 998) that the completion of the work is still impeded by many difficulties. During the past year the large amount of fog in the upper region of the Andes, the bubonic plague in Ecuador, and the invalidism of several of the officers in charge have greatly hampered operations. In order to keep the cost within the sum now available, it will be necessary to shorten the length of the arc, omit the pendulum observations, and curtail operations in other ways. The report argues strongly against this impairment of the original plan, urges that every effort be made to carry out the work in its entirety, and asserts that, even after allowing for further delays, the whole undertaking should be completed by May next year.

CHILEAN METEOROLOGY.—Five volumes of the *Anuario del Servicio Meteorológico de la Direccion del Territorio Marítimo* of Chile have thus far been published, for the period 1899-1903. These publications are not widely known. They are not listed, for example, in the *"Atlas of Meteorology."* They are of quarto size, and average between 400 and 500 pages. The marine meteorological service of Chile was under the direction of the Central Meteorological Observatory of Santiago until the year 1899, when it was transferred to the so-called Direccion del Territorio Marítimo. The observations contained in these volumes are made at stations situated on the coast of Chile, stretching from Arica in the north to the Strait of Magellan in the south, thrice daily, at 8 A. M., 2 and 9 P. M., although during the first half of 1899 the hours were 7.30 A. M., 1.30 and 9 P. M. Three times a month, on selected term days, observations were made every three hours until the year 1903. In the first volume, sixteen stations are included; in the second, fourteen; in the third and fourth, sixteen; and in the fifth, eighteen. In the volume for the year 1903, for each station which was in operation in 1902 and 1903 there is a graphic representation of the variations of the different meteorological elements during these two years. The curves for one year are in red, and for the other in black. These are the only diagrams in the five volumes. In 1903 the names, positions, and altitudes of the several stations were as follows:

STATION.	S. LAT.	W. LONG.	ALTITUDE (M).
Arica	18°28′05″	70°20′30″	5
Iquique	20°12′05″	70°11′03″	9
Antofagasta	23°38′54″	70°25′20″	4
Caldera	27°03′25″	70°52′40″	28
Isla Chañaral	29°00′50″	71°36′40″	48
Coquimbo	29°56′30″	71°21′30″	26
Valparaiso	33°01′05″	71°38′05″	41

STATION.	S. LAT.	W. LONG.	ALTITUDE (M).
Juan Fernandez	33°37′00″	78°50′00″	10
Constitucion	35°36′00″	72°38′00″	33
Talcahuano	36°36′51″	73°06′08″	91
Isla Santa Maria	36°59′05″	73°32′05″	65
E. of Isla Mocha	38°21′22″	73°58′06″	18
W. of Isla Mocha	38°22′12″	73°53′44″	32
Punta Niebla	39°52′02″	73°24′02″	43
Punta Galera	40°01′05″	73°44′02″	38
Ancud	41°51′00″	73°50′00″	48
Islote de los Evanjelistas.....	52°24′00″	75°06′00″	53
Punta Dungeness.....	52°23′55″	68°25′10″	3

It will be noted that these stations vary very little in longitude, and are all very near sea-level. This fact gives the data added interest.

While these volumes present no discussion, containing nothing beyond the tabulations and monthly and annual summaries, and while the records are not complete in some few cases, owing to illness or absence of observers, errors in or lack of instruments, and some diversity in methods of recording wind velocity, the material here collected is of very great value. Chile is in many respects the most interesting country in the world, climatologically. It has a great latitudinal extent. It ranges from aridity in the north to abundant rainfall in the south. It extends across the subtropical belt and into the belt of the prevailing westerlies of the Southern Hemisphere. It has certain striking resemblances to the climate of the Pacific coast of North America. For these and other reasons Chilean meteorological data are of peculiar value and interest, and these annual volumes of the marine meteorological service of Chile are welcome additions to the library of climatologists. R. DEC. W.

THE TRANS-SOUTH AMERICAN RAILROAD.—The resumption of work on the railroad between Buenos Aires and Valparaiso is announced. The completed line will be 893 miles long, and in the Andes region it will cross elevations over 10,000 feet above sea-level. The only section not yet built is in the Chilean Andes, and is 29.76 miles in length. When this very difficult part of the road is finished only a day and a half will be required for passage between the capitals of Argentina and Chile.

RAILROADS IN BOLIVIA.—The President of Bolivia has secured from Congress authorization to apply the $10,000,000 received from Brazil in the settlement of the Acre dispute to the construction of other railroads. That will not only open the way to the Amazon River by circumventing obstructions to the navigation of some of its tributaries, but will also connect the cities of La Paz, Oruro, Cochabamba, Potosi, and others. These new railroads will make some of the large mining centres much more easily accessible than at present.

ASIA.

CENTRAL ASIAN COTTON.—Ferghana, in Russian Central Asia, is Russia's largest source of raw cotton within her Empire. The *Board of Trade Journal* (No. 451) reports that the area under cotton in Ferghana, in 1904, was 504,900 acres, of which 467,100 acres were planted with American seed. The total harvest was 185,000 tons. The Marghilan district had the largest cotton area; but Andizhan

gave the best harvest, more than a third of the whole. Since 1900 the increased attention given to cotton-raising has stimulated irrigation and cultivation so that fertile land now brings many times its value ten years ago. The left bank of the Syr Daria for hundreds of miles will be capable of extraordinary productivity when irrigation works are developed; and in the Chimkent district alone there is said to be about 500,000 acres of good land.

GEOGRAPHICAL NAMES IN THE PHILIPPINES.—The *Official Gazette*, published at Manila, contains, from time to time, a list of the decisions of the Philippine Committee on Geographical Names. This Committee, appointed by Civil Governor Taft, in November 1903, consists of the chiefs of the Philippine Bureaux of the Coast and Geodetic Survey, the Ethnological Survey and Public Lands, and two Philippine members. Among the decisions rendered on May 1 last were Balintang for the island and channel north of Luzon, and Subic for the bay and town on the west coast of Luzon.

CLIMATE AND WEATHER OF TURKESTAN.—There is a good deal of climatological interest in the Carnegie Institution volume on *Explorations in Turkestan, with an Account of the Basin of Eastern Persia and Sistan*, by Professors Pumpelly and W. M. Davis, and Mr. Ellsworth Huntington (Washington, April, 1905). Both past and present climatic conditions receive consideration. Full confirmation has been found of the statements concerning "a progressive desiccation of the region of long standing, which has from a remote period continually converted cultivable lands into deserts and buried cities in sands" (p. 19). A view of one of these sand-buried cities is given on page 12. Abandoned sites of human occupation, large and small, and widely distributed, were discovered. A correlation of the physical and human histories is believed to be obtainable through a continuance of the investigation. The increased precipitation on the mountains of the Tian Shan as compared with the aridity of the deeper valleys, which are parched by evaporation into drying winds which descend over them, is noted (pages 71-72), and the observations of Sewerzow on the seasonable migration of the Kirghiz, with their flocks and herds, in search of vegetation at great altitudes, are confirmed by Davis. An interesting relation between insolation, vegetation, and erosion, as the result of differences of exposure, is also noted (p. 72). In the badlands of the Narin Basin (6,500-7,000 ft.) the sunny slopes were found to be bare and well dissected, while the shady slopes were smoother, and were covered by sparse herbage. On the high spurs of the Kungei Alatau (10,000 ft. and more), above the tree line, the sunny slopes were better covered with grass than the shady slopes. In the first case, sunshine promotes aridity and is hostile to vegetation; while, in the second, sunshine melts the snows, and is therefore favourable to vegetation.

Much attention is paid to oscillations of climate during recent geological times, and evidence is adduced in favour of five advances of the ice during as many glacial epochs. Between the advances there were periods of retreat almost as warm as, if not warmer than, the present climate. The climate of Persia is discussed (pp. 227-229) in connection with the characteristic physiographic forms of that country, and mention is made of the constant high and dry winds of the summer. These are very disagreeable, but have also certain useful effects. For example, in the houses of the wealthier classes an open doorway in the north (windward) side is stuffed with small brushwood, upon which a servant throws water. Evaporation then cools the air which whistles through the brush, and makes the interior of the house comfortable. If the wind fails, as it occasionally

does for a day or two, the heat within becomes insufferable. Windmills are built, often in rows of ten or twelve running east and west, in order that advantage may be taken of these summer winds. In one case fifty of these windmills were seen in one row. Because of these winds, no fruit can be raised upon trees in Sistan. The wild watermelon, under the influence of the winds, spreads its branches to the south, and they "lie in a long bunch so exactly oriented that the plants might almost serve as a compass." These prevailing winds have scooped great hollows, six or eight feet deep, in the plain, the long axis of these hollows being always directed to the north-northwest. Another curious effect is noted in the case of the sun-dried brick ruins of Sistan. When the old walls stand in a north-and-south direction—*i. e.,* parallel with the prevailing wind—they stand indefinitely, although gradually worn very thin; but when the walls stand east-and-west, they are very soon blown away, and disappear entirely (p. 229). An illustration (p. 229) shows some of these north-and-south walls standing, while there are hardly any east-and-west walls to connect them.

At the end of the Report on the Basin of Eastern Persia and Sistan, Mr. Huntington presents an interesting account of the relations of climatic changes and history in the region under discussion. He finds a striking agreement between legend, history, and physiography as regards evidence of climatic change, and after a careful investigation of the facts thus collected, he comes to the following conclusion:

> The history of Sistan, so far as it can be made out, seems to indicate a gradual desiccation of the country from early historical times down even to the present. The evidence of archæology, history, and tradition in the surrounding countries points in the same direction. At Sistan history and physiography appear to join hands, for the change from the conditions of greater water supply during antiquity to the desiccation of to-day is apparently the change from the last fluvial epoch to the present interfluvial epoch.

There is, further, much information in this Report concerning the action of wind in arid regions and concerning the climatic control of land forms, so that the volume will prove of value to the geologist, the physiographer, and the archaeologist, as well as to the climatologist. R. DEC. W.

THE METEOROLOGY OF INDIA, 1892-1902.—The period of 1892-1902 was marked by certain peculiar features in India which were unique in their degree of development and their persistence. From 1892 to 1894 there was excessive rain. From 1895 to 1902 there was a steady and persistent deficiency of rainfall over the greater part of India. This deficiency affected certain districts to such an extent that it caused two of the most extensive and most intense famines which have ever occurred in India. Similar features to those which were noted in India extended over a very wide area, probably including the Indian Ocean and adjacent countries, as well as the greater part of Southern Asia. Concerning most of this great area, the information at hand, or obtainable, is very meagre; but Sir John Eliot, late Meteorological Reporter to the Government of India, has made an admirable—as he calls it, "preliminary"—study of the more important features of the meteorology of this territory during this remarkable period, which appears as *Indian Meteorological Memoirs,* Vol. XVI, Part II, 1905. This folio volume, comprising 354 pages, with numerous tables and curves, does not attempt to "give a satisfactory and conclusive investigation of the primary causes or actions giving rise to these abnormal features," one of its main objects being "to indicate that it is absolutely necessary, in order to ascertain the causes of these and similar large variations, to study the meteorology of the whole Indo-Oceanic field."

R. DEC. W.

Criticism of Maps of Asia Minor.—In an address on "Exploration in Asiatic Turkey" before the Royal Geographical Society (*Geog. Jour., Sept.,* 1905), Col. P. H. H. Massy said the first difficulty which confronts the traveller in Asia Minor is the want of a good map. No reliable map is available. We owe thanks to Kiepert for placing something in our hands and for the present effort gradually to correct that something; but there is much still to be noted and corrected, and it is very desirable to encourage well-equipped volunteers to go out and systematically map Asiatic Turkey by sections.

Kiepert's new sheets are somewhat involved by a mixture of ancient and modern names. This is perhaps due to the information supplied by archæologists who have lately travelled there. It would be better to keep the modern entirely separate from the ancient; also to build up a new map gradually as reliable topographical information is obtained. The map of Northeastern Asiatic Turkey, by Mr. H. F. B. Lynch, is a great advance on earlier maps, but even this excellent map fails to show some routes which Col. Massy followed.

EUROPE.

A Fortnight at the Summit of Mont Blanc.—On June 17, according to the London *Times* (weekly edition, July 28), Mr. Millochau, of the Meudon Observatory, near Paris, started for the summit of Mont Blanc with several guides and porters, provisions, and astronomical instruments. They were caught in a violent thunderstorm on the way up the mountain, and were much exhausted when, on June 20, they reached the summit. The Janssen Observatory was found in fairly good condition, and, though it was not intended for a dwelling-house, it served this purpose for Mr. Millochau and his colleague, Milan Stefanik, who lived in it from June 20 to July 3. They employed themselves taking observations, and would have prolonged their stay beyond a fortnight if provisions on the way up to them from Chamonix had not failed to arrive on account of bad weather. During the last days of their stay they were reduced to short rations.

The Routes of Bird Migration in Europe.—*Ciel et Terre* for April 15, 1905, reprints from *Chasse et Pêche* some notes on bird migration in Europe by Dr. Quinet, who has also constructed charts showing the routes followed by the birds, and has prepared synoptic maps of these migrations. The summer and winter habitats of the different birds may thus be graphically shown; the points of departure; places for obtaining food; temporary resting-places; the direction of the migrations, and the final destinations. Dr. Quinet divides Europe into three large climatic zones, as follows:

Marine Climate.—1, Western Europe, with relatively mild summers and winters; 2, The Mediterranean region, with hot summers and mild winters.

Extreme Continental Climate.—Eastern Europe, with hot summers but cold winters.

Rains.—1, Western Europe has its maximum rainfall chiefly in autumn, when the warm and moist air of the westerly winds blows over cold land surfaces; 2, Central and Eastern Europe have chiefly summer rains, when the air is moist and is well warmed over the warm surface; 3, Northern Europe, with dry summers. In this general arrangement of climates the author finds explanation of the large migrations, which he studies out in detail, classifying them in a general way by points of the compass. The laws of bird migration are considered briefly, as well as the conditions under which the different birds journey, some by night,

some at dusk or dawn, some by day, some in groups, some by individuals, etc., etc. The darkest nights do not interfere with the movements of some, but thick fog brings them all to a stop if they are flying over the land, while those which are crossing the sea lose their way or beat against lighthouses or the lights of vessels. Mountain ranges, steppes, oceans, deserts, whether of ice or of sand, are impassable barriers for most migrating birds, forcing them to seek other routes along which they may rest and find food. The Asiatic species, in their migrations, follow the same general directions as do those of Europe—namely, from northeast to southwest in autumn, and from southwest to northeast in spring. These directions Dr. Quinet finds the logical ones in view of the general distribution of climates; but they are not rigidly adhered to, and many birds of passage travel directly north and south. R. DEC. W.

THE FLOW OF THE THAMES IN RELATION TO PRESSURE AND RAINFALL CHANGES.—In *Nature* for June 22, 1905, Dr. W. J. S. Lockyer considers the relation of *The Thames Flow and British Pressure and Rainfall Changes.* Curves are plotted showing the Thames flow, and the rainfall and pressure (curves inverted) for a period of about forty years, with the result that there is a striking similarity in the lines. Hence Dr. Lockyer believes that any method of forecasting pressure would make it possible to determine the rainfall beforehand. He finds that in some years the British area belongs to a pressure system that extends over the region of which India is about the centre, and then in another series of years the British Isles are dominated by the antipodal pressure system of which South America is the middle portion. This complexity makes it difficult at present to forecast British pressures, but the author believes that further investigation will throw much light on the subject. R. DEC. W.

INVERSIONS OF TEMPERATURE ON BEN NEVIS.—Mr. Andrew Watt, of the Scottish Meteorological Society, discusses the inversions of temperature noted between the base and summit of Ben Nevis during the thirteen years, 1891-1903, in *Nature*, Vol. 71, 1905, pp. 583-584. The inversions are grouped according as the summit temperature was higher—(1) At one hour at least of the day; (2) at each of the twenty-four hours of the day; (3) in the mean of the twenty-four hours of the day. The number of cases was as follows:

	Class 1.	Class 2.	Class 3.
January	7	..	3
February	18	1	5
March	11	..	1
April	9	..	..
May	7	..	..
June	8	..	..
July	4	..	..
August	4	..	..
September	22	..	3
October	15	..	5
November	29	3	8
December	24	5	8
Year	158	9	33

It appears that inversions which continued throughout the whole twenty-four hours occurred only in February, November, and December; while those of Class 3

occurred between September and March only. The average difference of temperature between Ben Nevis and Fort William ranged from 16.8° F. in April to 14.4° in December. The mean difference for the whole year is 15.4°. Inversions at all seasons are large departures from the usual conditions. In February, 1895, at 9 A. M., on the 19th, the summit was 17.6° warmer than the base (Ben Nevis, 33.6°; Fort William, 16.0°). This is the greatest inversion recorded there. The inversion of the greatest duration was in November, 1897, when the temperature at the summit was higher than that at the base for fifty-eight consecutive hours. The mean daily temperature on November 4, 1897, was 9.7° higher on Ben Nevis than at Fort William. R. DEC. W.

THE ORDNANCE SURVEY.—The annual report of the progress of this survey to March 31, 1905, shows that great advance has been made during the past year. The map, on a scale of one inch to a mile (Outline and Hill editions), has been completed for the entire United Kingdom. The coloured edition has been completed for England and Wales and begun for Scotland. About three-quarters of the coloured map of Ireland has been finished. The two-mile drawing of England and Wales has been completed, and more than half of it has been published. The Outline edition, on a four-mile scale, has been published for the whole of the United Kingdom; and county and district maps with main roads coloured have been published for the whole of Great Britain. The ten-mile map in colours has been published for Great Britain, and will soon be issued for Ireland. The map on a scale of 1:1,000,000 has been completed and published in colour for the whole of the United Kingdom. All these maps, excepting the last named, will soon be procurable, folded for the pocket. The Ordnance Survey maps are now supplied to schools at a very low price. It is hoped that this will help to improve geographical education and make the maps better known to the general public.

CABLE TO ICELAND.—*Export* (No. 29, 1905) says that arrangements have been fully completed for laying a cable between Iceland and the Shetland and Faroe Islands. The Shetlands are already connected with mainland by cable. The new cable will extend from the Shetlands to Thorshavn on the Faroes, thence to Iceland and Scotland; thus the electric communications with the continent which Iceland has so long desired will be secured. The Great Northern Telegraph Co. has the concession for laying and operating the cable. Not only Denmark and Iceland, but also all countries that are interested in the Iceland fisheries, will profit by the cable, and the daily weather report from Iceland will be of immense service to navigators and to science. The cable will be landed on the east coast of the island, and the Government of that colony will build and maintain the land line that will connect the cable with Reykjavik.

POLAR.

RESCUE OF THE ZIEGLER-FIALA EXPEDITION.—The *Terra Nova,* which sailed for Franz Josef Land early in the summer to rescue the Ziegler North Polar Expedition, has returned with all the members on board excepting a Norwegian sailor, who had died. The Fiala party had not been heard from since it left Norway in July, 1903, until its relief by the *Terra Nova* on August 1, this year. The explorers experienced great hardships, as their vessel, the *America,* was crushed in the ice a few weeks after they reached Franz Josef Land. The fol-

lowing facts are condensed from Mr. Fiala's statement published in the London *Times* (weekly edition, Aug. 25), which gives the fullest account of the expedition yet published.

The *America*, with the expedition on board, left Vardö on July 10, 1903, and, after considerable delay among the ice fields, arrived at Cape Flora in the southern part of Franz Josef Land on August 12, where a small supply of provisions was landed. The vessel then proceeded up the British Channel to Teplitz Bay, Crown Prince Rudolf Island, the most northern harbour in Franz Josef Land. Here the base camp of the expedition was established and named Cape Abruzzi. Part of the cargo, including ponies and dogs, was landed with difficulty, as the ship was in the ice nearly a mile from the shore. A house was then constructed.

On November 21 the *America* was crushed in the ice. She did not disappear until January 22, when all the old ice was broken up, the ship sank, and also 100 tons of coal and 40 tons of provisions, which had been cached on the ice and could not be sledged to camp on account of the almost continuous storms.

In March, 1904, two parties left camp on the sea-ice for the north. Both attempts to make a high northing were failures:

> The ice conditions were frightful, and nearly every one of the sledges was hopelessly smashed, making it absolutely necessary, if the equipment was to be saved for another attempt in the following year, that the party should return to Camp Abruzzi. Though this column only reached a comparatively short distance from land, all the way had to be cut with ice axes, and it now became clear that it was useless to attempt to get further north during the spring of 1904.

The summer and fall of 1904 were spent chiefly in watching for the relief ship which, it will be remembered, was baffled by the ice and had to return to Norway. By September 10 it was realized that the party would be compelled to spend a second winter in the Arctic. Coal was discovered 600 feet up the side of a steep mountain, and it augmented the fuel supply.

The party prepared to make a spring sledge trip to the north. It was ready to leave in February, but the weather was even worse than during the previous year. The start was delayed until March 16. Very slow progress was made, as the ice was rougher than in 1904. All the sledge men had to work at cutting the trail and then return to help the dog teams over the rough road. Deep snow, numerous stretches of open water, and fog all helped to delay progress. Realizing that the record for progress north could not be beaten under such circumstances, the party returned to camp. The outlook for the relief ship was resumed, and on Sunday, July 30, the news came that the *Terra Nova*, with Mr. Champ in command, had arrived at Cape Dillon. No time was lost in getting the party together and starting southward.

The avowed purpose of both the Ziegler expeditions was to reach the north pole, or at least attain a high latitude. The second expedition seems to have been even less successful than the first, under Mr. Baldwin, for he at least succeeded in planting tons of supplies on Crown Prince Rudolf Land, near the most northern camp which the Fiala party established. This party did not succeed in getting the larger part of the supplies brought by the *America* to land. Though they had been placed on the ice within less than a mile from the shore many weeks before, they were finally engulfed in the sea. With this large supply of fresh stores lost, the Fiala party could scarcely have survived if it had not been for the dépôts which Baldwin had planted in their neighbourhood. No important scientific results of the expedition have yet been described.

ANTARCTIC METEOROLOGY.—Mr. R. C. Mossman, who was in charge of the

Antarctic Meteorological Station at Scotia Bay, South Orkneys, contributes to *Symons's Meteorological Magazine* for June some account of the work, and of the phenomena observed, at that station. Much trouble was experienced with the wet bulb thermometer, and at temperatures below 10° F. the muslin covering was done away with altogether, and the bulb was painted with water by use of a camel's hair brush. Most of the snow that fell was hard and granular; large flakes were rarely seen. Ice storms were frequent, and gave much trouble. Snow crystals were observed to be deposited from fog. Remarkable mirages were common, and solar and lunar halos, accompanied by mock suns or moons, with horizontal and vertical circles, were occasionally observed, but rainbows were uncommon. Colourless fog bows were noted at times, but not a single case of the aurora was seen. Neither Nordenskjöld nor Charcot, who both wintered farther south than the South Orkneys, reported any auroras. Stratus clouds were the commonest cloud-forms in summer and winter. In the former season they covered the sky for days together without a break. Cirrus clouds were seen at very low altitudes, from 6,000 to 8,000 feet above the surface. Foehn winds were noted on several days, usually in winter, and invariably blew from the W.N.W., across some high mountains. None of the curious rises of temperature during blizzards, which were reported at the winter quarters of the "Discovery" and by Nordenskjöld, were observed. The minimum temperature recorded was —40° F. The mean annual approximates 23° F. R. DEC. W.

PERSONAL.

Dr. A. J. Herbertson has been appointed Reader in Geography in the University of Oxford from October 1, to succeed Mr. H. J. Mackinder, who resigned the readership to give his whole time to the work of the London School of Economics. Dr. Herbertson is also editor of the *Geographical Teacher*, one of the authors of the Atlas of Meteorology, and in the past ten years has contributed largely to the literature of educational and other branches of geography.

Professor Guido Cora, the well-known Italian geographer, has been elected a member of the Pontificia Accademia Romana dei Nuovi Lincei of Rome.

Mr. Bailey Willis, who went to Europe in July to make certain studies under a grant of the Carnegie Institution, returned home in July.

Professor T. C. Chamberlin has been appointed a member of the Illinois Survey Board, the other members being Governor Deneen (*ex officio*) and President James of the State University.

Dr. Siegfried Passarge, Privatdocent in Geography at the University of Berlin, has accepted a call to be Professor of Geography at the University of Breslau.

GENERAL.

BIBLIOTHECA GEOGRAPHICA FOR 1901.—Each of the annual volumes of this standard work of reference is welcomed as a library convenience of the first class. The volume for 1901 has 571 pages, and practically covers the entire literary geographical output for the year. It is gratifying to read in Editor Baschin's Preface that Vol. XI (1902) will probably be issued in less than a year after the publication of Vol. X. Little can be done to improve this useful and comprehensive bibliography excepting to fill up the rather wide gap between the year treated and the date of its publication. The work of preparing each volume is very great, and most of it devolves upon Mr. Baschin, but it is to be hoped that gradually

he may be able to bring the annual up nearer to date. This wish may be expressed, not in the way of criticism, but merely in the belief that such a consummation is to be desired as soon as it can be attained.

Mistakes are surprisingly few. It was easy, however, to make the blunder of presenting the work of two American writers named Adams and bearing the same initials as the literary output of one man.

A BIBLIOGRAPHY OF LITHUANIA.—Mr. Baltramaitis has prepared a list of the literature relating to Lithuania, its geography, history, law, statistics, and ethnography, including folklore. There are 8,514 titles, and the bibliography fills 614 pages in Vol. XXV of the *Memoirs* of the Russian Geographical Society. It is followed by an Appendix containing a list of 2,665 Lithuanian and old Prussian books printed from 1553 to 1903.

EXPLORATION OF GOUGH ISLAND (DIEGO ALVAREZ).—This island lies in the Southern Atlantic, about 1,500 miles W. by S. of the Cape of Good Hope, with the island of Tristan da Cunha as the nearest land, 280 miles away. It is above 8 miles long and 4 miles broad, and is one of the peaks of the mid-Atlantic ridge, which probably makes its most southerly appearance above the surface of the ocean in Bouvet Island. Though it was no doubt discovered in the sixteenth century, and has been sighted or visited by a considerable number of navigators, the island remained practically unexplored until the Scottish National Antarctic Expedition landed there in April, 1904, on its way from the Antarctic to Cape Town. The visit was brief, but observations and collections were made, and the results were important, for this rock was really the only Atlantic island which was still unexplored. Mr. R. N. Rudmose Brown, one of the party, gives a description of the island, with illustrations, in the August number of the *Scottish Geographical Magazine,* and the following facts are taken from his article:

The party were pleasantly surprised to find the island beautifully clothed in green from the water's edge almost to the summit. Numerous brooks were pouring out of the hanging valleys and leaping over the sheer precipices some hundreds of feet into the sea. The island is very precipitous, and in most places rises from the sea in cliffs that are from 200 feet to nearly 1,000 feet in height near the northern end.

Above these cliffs the ground rises more gradually towards the summit, which is estimated to be 4,380 feet in height. Towards the south-west end of the island there is a more or less level plateau, about half a square mile in area, at an elevation of about 300 feet. Everywhere else the island seems to rise into steep ridges separated by narrow glens.

At the foot of many of the cliffs is a narrow strip of beach or rocks at low tide, but the interior is accessible only from a few places on the shore. At the seaward end of the glen, on the east side, is the best landing-place, and here a number of ruined huts may still be seen. A settlement here would have shelter except from the east; there is a good supply of fresh water, and about an acre of level ground might be used for raising vegetables, or even for grazing. There is really no good anchorage, for the water deepens rapidly and the holding-ground is bad.

Dr. Pirie, of the same expedition, says the island has some resemblance to Madeira in its jagged outlines and steep slopes and cliffs cut deeply by ravines; but it differs from Madeira in the height and steepness of the cliffs, which nearly everywhere come sheer down to the sea without any gradual slope. As far as is known the rocks are wholly of volcanic origin.

Twenty-three or twenty-four species of birds were recorded, of which the expedition collected nineteen. The only mammal is a mouse, introduced by earlier visitors. The vegetation is dense in most parts, and it is consequently difficult to move over the island. Thick tufts of tussock grass (*Spartina arundinacea*) grow in abundance over all the lower ground. Gnarled and stunted trees (*Phylica nitida*) grow from sea-level to almost 2,000 feet. The flora, as now known, contains 17 species of flowering plants, 10 of ferns, 10 of mosses, 3 hepatics, 7 lichens, and 1 fungus, besides several small algæ. As the island lies in the region of prevailing westerly winds, stormy weather and heavy seas are common.

A Supplement to Dr. Mill's Hints to Teachers.—Eight years ago Dr. H. R. Mill published a small book entitled "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading." The object of the little volume was to place before teachers and students a selection of the best books on geography as an educational subject and on different parts of the world. The book has been used with great advantage both in the United Kingdom and this country; and in preparing a list supplementary to that which Dr. Mill collected Dr. A. J. Herbertson has continued and augmented the usefulness of this entire selection of text-books and works of reference that are especially useful to teachers and students. With the mention of each book in the later list are a few lines of description or characterization. Seventy-seven works, most of which have been published since 1897, are included in the parts of the supplementary list printed in *The Geographical Teacher*, No. 10, 1904, and No. 12, 1905.

The Fiftieth International Congress of Americanists will meet at Quebec from Monday, the 10th, to Saturday the 15th, of September, 1906.

The membership fee is Three Dollars (fifteen francs, twelve marks). Members are entitled to vote, to take part in the decisions, and to receive *gratis* the publications of the Congress.

Associate Members pay a fee of One Dollar (five francs, or four marks). They may attend all the general meetings, but they have no vote, and they do not receive the publications.

Payment of fees to be made by P. O. order, or by cheque negotiable at Quebec, drawn to the order of the Treasurer of the Committee of Organization, M. Alphonse Gagnon, Parliament House, Quebec.

NEW MAPS.

AFRICA.

Northeast Africa.—Four Sketch Maps. Scales, 1:12,500,000 and 1:18,000,000. By Fernand Maurette. *Annales de Géog.*, No. 76. Armand Colin, Paris, 1905.

These black-and-white maps include the triangular territory between Cape Guardafui and the Upper Nile, and between Eritrea and British East Africa. They were compiled from authoritative sources to show the present condition of our knowledge of this part of Africa in respect to its topographic relief, climate, hydrography, and distribution of vegetation. They illustrate the first part of an exhaustive study by Mr. Maurette, entitled, "État de nos Connaissances sur le Nord-Est Africain."

LIBERIA.—Sketch Map of the Republic of Liberia. Scale, 1:2,000,000, or 31.56 statute miles to an inch. The *Geog. Jour.*, London, August, 1905.

Illustrates a paper by Sir Harry Johnston on his recent visit to the negro Republic. Tints show the densely-forested area and the districts occupied by the civilized Liberians. The principal rubber-collecting stations are indicated.

SOUTH AFRICA.—Geological Sketch Map of Zululand. Scale, 5 statute miles to an inch. By William Anderson, Government Geologist. Second *Report* of the Geological Survey of Natal and Zululand. London, 1904.

The general survey of Zululand has been carried to the northwestern border. Much accurate information has been collected concerning the wide cretaceous belt of the littoral. In the Ecca series no evidence of the presence of coal in paying quantities has yet been discovered.

SOUTH AFRICA.—Geological Map of Melmoth District, Zululand. Scale, 1½ statute miles to an inch. By William Anderson, Government Geologist. Second Report of the Geological Survey of Natal and Zululand. London, 1904.

AMERICA.

WEST INDIES.—Cuba. Scale 1:1,875,000, or 29 statute miles to an inch. By H. Habenicht. *Pet. Mitteil.*, Vol. 51, No. 7. Justus Perthes, Gotha, 1905.

Illustrates a paper by Prof. Karl Sapper, on Cuba under U. S. military régime and as a Republic. The map was compiled from the old map by Coello, the British Admiralty charts, the U. S. Hydrographic Office charts, and the military map issued by our War Department in 1898. It is a very careful compilation of the best data available, is from two to three times as large as the atlas sheets of the island, and contains much information that cannot well be presented on maps of smaller scale.

UNITED STATES GEOLOGICAL SURVEY.

ALASKA.—Geologic Reconnaissance of the Yukon-Tanana Region. Scale, about 43 statute miles to an inch. By Louis M. Prindle, Arthur J. Collier, and Alfred H. Brooks. U. S. Geol. Sur., *Bull.* No. 251. Washington, D. C., 1905.

This map has most significance to the placer miner from the fact that it shows the distribution of the metamorphic sediments which nearly everywhere seem to be the source of the placer gold. Mr. Prindle, who writes the accompanying geologic sketch, says the igneous rocks of the Rampart formation may also be gold-bearing, but in the placer districts he has studied the source of the gold seems to lie in the metamorphic sediments, and hence the most promising fields for prospecting are the areas occupied by these rocks.

ALASKA.—Map of Forty Mile Quadrangle. Scale, 1:250,000, or 3.95 statute miles to an inch. U. S. Geol. Sur., *Bull.* 251. Washington, D. C., 1905.

This Quadrangle was mapped by Mr. E. C. Barnard in 1898. The map may be examined to advantage by those who are studying how to read contoured maps in connection with the geographical description beginning on page 18.

ALASKA.—Reconnaissance Map of Fairbanks and Birch Creek Districts. Scale, 1:250,000, or 3.95 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905.

The area was surveyed in 1903. Topography by T. G. Gerdine and R. D. Oliver; triangulation by Mr. Gerdine. Contour interval, 200 feet. The probable drainage not surveyed is indicated by broken lines. In the Fairbanks district, the

mining region in which there is present interest lies between the Little Chena and the Chatanika Rivers, and is drained by their tributaries.

ALASKA.—Reconnaissance Map of Yukon-Tanana Region. Scale, 1:625,000, or 9.88 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905. (In pocket.)

This topographic reconnaissance was made by Messrs. Gerdine and Oliver in 1903. The survey extends between Eagle on the Yukon and the Tanana, and from the Tanana to Circle on the Yukon. Curiously enough, there is one important gap between the Salcha River and Fairbanks, near the Tanana, due to the fact that the survey was here interrupted by a dense pall of smoke from forest fires.

ALASKA.—Geologic Reconnaissance Map of the Fairhaven Placer Field, Northeastern Portion of Seward Peninsula. Scale, 1:250,000, or 3.95 statute miles to an inch. By Fred. H. Moffit. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905. (In pocket.)

The sheet shows the areal distribution and structural relations of the different formations as accurately as possible, considering the short season of work. The distribution of the gravels producing gold and those known to carry gold are shown.

ALASKA.—Reconnaissance Map of the Northeastern Portion of Seward Peninsula. Scale, 1:250,000, or 3.95 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. D. C. Witherspoon, Topographer. U. S. Geol. Sur., *Bull.* No. 251. Washington, D. C., 1905. (In pocket.)

The region mapped occupies the northeastern portion of Seward Peninsula, and includes a little more than one-quarter of its total area, or about 7,500 square miles. It embraces most of the mining precincts of the Fairhaven, Good Hope, Kugruk, and Koyuk districts. Viewed as a whole, the northern part of Seward Peninsula is characterized by low relief and monotonous appearance.

NEVADA.—Geological Reconnaissance Map of Nevada South of the 40th Parallel and Adjacent California. (Second Edition in pocket.) Scale, 1½ miles to an inch. By J. E. Spurr. U. S. Geol. Sur., *Bull.* No. 208. Washington, D. C., 1905.

A rough, general, geological map, made to fill up a large gap. While in its larger features it is correct and has much value as a pioneer map, it does not pretend to exactness as to details.

ASIA.

MALAYAN ARCHIPELAGO.—Map of the Philippines. Scale, about 60 statute miles to an inch. The *Nat. Geol. Mag.*, August, 1905, Washington, D. C.

This map is evidently a U. S. Government product, but its origin is not mentioned. The relief is poorly shown, even considering the meagre data. The nomenclature is by no means as full as the scale would justify. The chief purpose seems to be to show the Government and private telegraph and cable lines, which are very clearly indicated. The cable from Guam enters Philippine waters through San Bernardino Strait north of Samar, and passes between Luzon and Mindoro to Manila.

CHINESE TURKESTAN.—Map of Portions of Chinese Turkestan. Surveyed under the Direction and with the Assistance of M. A. Stein. (Two Sheets.) Scale, 12 statute miles to an inch. Compiled in the Trigonometrical Branch Office, Survey of India, Dehra Dun, 1903.

This map illustrates the explorations of Dr. Stein in 1900-01, when he found many remarkable ruins of ancient civilization in the Takla-Makan Desert in the southern part of the Tarim Basin. Most of the country is shown for several miles on both sides of his route, and all ruins, springs, the limits of cultivation along the desert, mountain ranges with permanent snow, glaciers, numerous heights in feet and other information are given. Latitudes were astronomically determined, and the longitudes require a correction of 2′ 7″ to make them accord with the geodetic longitude of Madras Observatory.

CHINESE TURKESTAN.—Map of Muztagh-Ata and Lake Little Karakul. Prepared by Lieut. F. B. Tillard from photo; Theodolite Survey by M. A. Stein. Scale, four statute miles to an inch. Trigonometrical Branch Office, Survey of India, Dehra Dun.

In the region of the water-parting between the Tarim and the Amu-daria (Oxus) River systems.

CENTRAL ASIA.—Geological Sketch Map of Parts of the Provinces of Tsang and Ü in Tibet. Scale, 32 statute miles to an inch. By H. H. Hayden. *Records* of the Geological Survey of India, Vol. 32, Part 2. Calcutta, 1905.

The geological observations in Southern Tibet recorded on this map were made by Mr. Hayden during the mission to Lhasa under Col. Sir F. E. Younghusband, who has called attention to the untiring energy of this observer in utilizing every opportunity for scientific work while in a hostile country. The map shows that the Tibetan zone to the north of the Sikkim boundary is composed of a variety of sedimentary formations representing the lower Tertiary, Cretaceous, Jurassic, probably Trias, and possibly some of the Palæozoic systems. The formations are often metamorphosed, but occasionally highly fossiliferous.

EUROPE.

GERMANY.—Die Herkunft der deutschen Siedler im Königreich Sachsen nach Ortsnamen und Mundarten. By P. Langhans, after Alfred Meiche. *Deutsche Erde,* Vol. 4, No. 5. Justus Perthes, Gotha, 1905.

Nine small maps of Saxony, designed to show the origin of the German settlers as indicated in the nomenclature and the spoken dialects.

TURKEY-IN-EUROPE.—Harta Geografica a Turciei Cu Comunele Românesti. Scale, 1:1,250,000, or 19.7 statute miles to an inch. *Buletin* of the Rumanian Geographical Society, Vol. 25, No. 2, 1904, Bucharest.

Shows the areas in European Turkey which are chiefly occupied by Rumanians.

NORWAY.—Topografisk Kart over kongeriget Norge. Scale, 1:100,000, or 1.5 statute miles to an inch. By the Norwegian Geographical Institute. Christiania. (Price, kr. 0.60 a sheet.) Sheets: Galdhöpiggen, 30 D; Svartisen, J 15; Hammerfest, U 3; Rolfsö, U 2; Söndre Faemund, 38 B; Dunderlandsdalen, K 15; Hjelmsö, V 1; Tana, Z 3; Kristiansand, 5 A; Kristiania, 14 D; Hönefoss, 19 B; Gran, 19 D; Hamar, 26 A; Aamot, 26 C.

The Norwegian Geographical Institute, founded in 1867, was united in 1872 with the Topographic Survey, and since then all the official surveys and maps of Norway have been the product of one or another of the six departments of the Institute. The work on the topographic map has been in progress for about thirty years and up to April last 183 of the topographic sheets had been completed, work was in progress on 13 sheets, and the geological data had been superimposed on

26 sheets of the topographic map. Over one-third of the area is still to be surveyed. These sheets are fine specimens of cartography. The earlier ones were engraved on copper, but lithography and photo-engraving have been employed since 1881. Hill features are shown chiefly by contours with 100 feet interval, and in some areas by hachures. Standing waters are in blue, rivers in black, glaciers in green, and forests and important tilled areas are indicated. The location of many small towns is shown without names. In a thinly-peopled land so crowded with mountains as to make topographic surveying very difficult and expensive, as in Norway, progress in detailed map-making is necessarily slow; but that country is to be congratulated upon the high quality and advanced state of its topographic map.

POLAR.

ANTARCTIC.—Bathymetrical Survey of the South Atlantic Ocean and Weddell Sea. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. By William S. Bruce. *Scot. Geog. Mag.,* August, 1905, Edinburgh.

The map accompanies a paper by Mr. Bruce, leader of the Scottish National Antarctic Expedition. Eight tints show contours of depth. Illustrating the results of the *Scotia's* bathymetrical work, it is interesting to compare it with previous maps, which are chiefly theoretical, and based, to a large extent, only on Ross's soundings. Mr. Bruce uses the few soundings taken by the Swedish expedition to the west, and those of the *Valdivia* to the east, of Bouvet Island.

Among the especially interesting features is the deepening of the ocean as the *Scotia* sailed eastward in Weddell Sea; the coast for 150 miles of the newly-discovered Coats Land, at two points along whose shores, thirty miles apart and two miles from land, the *Scotia* made soundings of 159 and 161 fathoms; the line of shallow water up to Gough Island for 750 miles along the meridian of 10° W.—a discovery of the greatest importance, as it shows a continuation of the South Atlantic rise 1,000 miles farther south than it was known to exist; and the hypothetical coast-line of Antarctica according to Bruce, who gives a much larger extension to the south polar continent and makes it appear more continuous, especially in the regions of Graham Land and the Weddell Sea, than any other recent cartographer.

ANTARCTIC.—Deep Sea Deposits of the South Atlantic Ocean and Weddell Sea. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. By J. H. Harvey Pirie. *Scot. Geog. Mag.,* August, 1905.

Illustrates a paper by Mr. Pirie on the dredging results of the *Scotia* expedition. A belt of Globigerina ooze, narrowing towards the west, is shown, roughly speaking, as far south as the 55th parallel. It includes an area of red clay; this is succeeded on the south by the circumpolar band of Diatom ooze, which, in turn, gives place to blue mud and terrigenous deposits and an area of blue mud approaching red clay in the most southerly waters visited. Specimens of volcanic mud were obtained most frequently in the southern areas, and may be the product of sub-marine volcanic activity, or they are perhaps derived from the active volcanoes or volcanic rocks of West Antarctica or the South Shetlands.

ATLASES.

MEYERS HAND-ATLAS.—Dritte, neubearbeitete und vermehrte Auflage, mit 115 Kartenblättern and 5 Textbeilagen. 40 Lieferungen, including index to place-names. Verlag des Bibliographischen Instituts, Leipzig and Vienna, 1905. (Price,

30 pf. a part, or M. 15 for the Atlas bound, including index to place-names; M. 10, not including index.)

A superior small atlas at a very cheap price. Many of the plates are the latest revision of map plates in the sixth edition of Meyers Konversations Lexikon; others appear to have been especially made for the Atlas. The effort is apparent to give the latest information, the excellent map of German Southwest Africa showing military routes and battlefields in 1904, and the concentration camps of the Herero and Hottentots. Special prominence is given to Germany, its Colonies, and Austria-Hungary, as they have 44 of the 115 map sheets. The remainder of Europe has 28 sheets; Asia, 13; Africa, 6; America, 15; and Australia and Oceania, 2. The size of the page makes this Atlas very easy to handle. Accurate map products, such as this, are calculated to serve the needs of a large part of the public, even though lacking much information that can be supplied only on maps of larger scale.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 47 and 48. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each part containing 2 map sheets.)

This finest edition of Stieler's Hand-Atlas is now approaching completion. The progress of oceanography in the past ten years is strikingly illustrated by comparing sheet 3 with the corresponding sheet of the eastern and western hemispheres in the edition of 1895. Many changes in the contours of the ocean beds, especially in the Pacific and Antarctic Oceans, are indicated. Sheet 4, the commercial and political map on the Mercator projection, is most noteworthy for fulness of information relating to sea routes, which are shown in far greater number than in the earlier editions. The Cable Routes inset is reproduced, but the other two insets are new. One shows the fastest routes of transportation between the continents and around the world, and the other the official languages of the various countries. Sheet 68, the general map of Africa, marks the present political boundaries, indicates sand wastes for the first time by colour, gives contours of depth around the coasts, and shows the present state of railroad development. Sheet 75 is South Africa as far north as 10° S. Lat. on a scale of 1:7,500,000. The eight sheets of Africa are all new plates, and the manner in which they divide the continent makes them more convenient for reference than the earlier map of Africa in this Atlas.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Atlantic Ocean. August, 1905.

The path of the total solar eclipse across the ocean is superimposed. Extracts from circulars issued by the U. S. Naval Observatory relating to the eclipse are printed on the reverse side.

Pilot Chart of the North Atlantic Ocean. September, 1905.

The paper by Mr. James Page, editor of the Pilot Charts, on West Indian Hurricanes, is reprinted on the reverse side from Hydrographic Office Publication No. 86.

Pilot Charts of the North Pacific Ocean. August and September, 1905.

In view of the approaching period of maximum frequency of typhoons in the Eastern Asiatic waters, a description and explanation of them are printed, with a chart illustrating a cyclonic storm at sea in the northern hemisphere.

ACCESSIONS TO THE LIBRARY.

JULY–SEPTEMBER, 1905.

AFRICA.

BARROIS, JULIEN.—Les Irrigations en Égypte. (Planches.) Paris, Ch. Béranger, 1904. 8vo.

EGYPT EXPLORATION FUND. Archæological Survey of Egypt. Fourteenth Memoir: Rock Tombs of El Amarna, Part II. By N. de G. Davies. 47 Plates. London, Egypt Ex. Fund, 1905. 4to.

FREYCINET, C. DE.—La Question d'Égypte. Paris, Calmann-Lévy [1905]. pr., 8vo.

SAMASSA, PAUL.—Das neue Südafrika. Berlin, C. A. Schwetschke und Sohn, 1905. 8vo.

SCHILLINGS, C. B.—Mit Blitzlicht und Büchse. Neue Beobachtungen . . . in der Wildnis . . . von Äquatorial-Ostafrika. (Abbildungen.) Leipzig, R. Voigtländer, 1905. 8vo.

WEISGERBER, F.—Trois Mois de Campagne au Maroc. Étude Géographique . . . Cartes, &c. Paris, Ernest Leroux, 1904. 8vo. [*Gift, from the author.*]

WILLIAMS, GARDNER F.—The Diamond Mines of South Africa. Illustrated. New York, B. F. Buck & Co., 1905. 2 vols., 8vo. [*Gift, from the Author.*]

AMERICA.

ANSPACH, C. A.—Geschichte und Beschreibung von Newfoundland und der Küste Labrador. Aus dem Englischen übersezt. Mit 2 Charten. *Neue Bibliothek der wichtigsten Reisebeschreibungen* [*30th vol. of Second Series, 2nd Part*]. Weimar, Gr. H. S. p. Landes-Industrie Comptoirs, 1822. 16mo.

BUIES, ARTHUR.—Le Saguenay et la Vallée du Lac St. Jean. Québec, A. Coté et Cie, 1880. 16mo.

CAMPBELL, DUNCAN.—History of Prince Edward Island. Charlottetown, Bremner Bros., 1875. 16mo.

DAWSON, SAMUEL EDWARD.—The Saint Lawrence: its Basin and Border-Lands. Maps, &c. New York, Frederick A. Stokes Co. (1905). 8vo.

GOSSELIN, AUGUSTE.—Jean Bourdon et son ami l'abbé de Saint-Sauveur. Episodes des Temps héroiques de notre Histoire. Québec, Dussault et Proulx, 1904. 16mo. [*Gift from l'Université Laval, Quebec.*]

GUTIÉRREZ DE SANTA CLARA, PEDRO.—Historia de las Guerras Civiles del Perú (1544–1548) y de Otros Sucesos de las Indias. Tomo III. *Colección de Libros y Documentos Referentes á la Historia de América, Tomo IV.* Madrid, Victoriano Suárez, 1905. 8vo.

HARRIS, WILLIAM TELL.—Bemerkungen auf eine Reise durch die Vereinten Staaten von Nord-Amerika, 1817–1819. Aus dem Englischen übersezt von C. F. Leidenfrost. *Neue Bibliothek der wichtigsten Reisebeschreibungen* [*30th vol. of Second Series, 1st Part*]. Weimar, Gr. H. S. p. Landes-Industrie-Comptoirs, 1822. 16mo.

HEILPRIN, ANGELO.—Tower of Pelée. New Studies of the Great Volcano of Martinique. Illustrated. Philadelphia, J. B. Lippincott Co., 1904. 4to.

LYNCH, JEREMIAH.—Trois Ans au Klondike. Traduit de l'anglais par Paul Lefèvre. (Carte, &c.) Paris, Ch. Delagrave [1905?] pr., 8vo.

MINNESOTA HISTORICAL SOCIETY.—Collections, Vol. 1. Being a Republication of the Original Parts issued in 1850–'56. St. Paul, Ramaley, Chaney & Co., 1872. 8vo.

NUÑEZ, RICARDO ET JALHAY, HENRY.—La République de Colombie. 2e Edition. Bruxelles, Désiré Stevelinck, 1898. 8vo.

PERPIÑÁ, ANTONIO.—El Camagüey. Viajes pintorescos por el interior de Cuba y por sus costas. [Illustrated.] Barcelona, J. A. Bastinos, 1889. 8vo.

SHELDON, E. M.—The Early History of Michigan, from the first Settlement to 1815. [Plan, &c.] New York, A. S. Barnes & Co., 1856. 8vo.

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BOOK NOTICES.

Meteorological Results of the Nansen Expedition.—The Norwegian North Polar Expedition, 1893-96. Scientific Results, edited by Fridtjof Nansen. Vol. VI. Meteorology. By H. Mohn. Published by the Fridtjof Nansen Fund for the Advancement of Science. 1905. Pp. xiv + 659. Pls. XX.

In these days of many polar expeditions, both Arctic and Antarctic, and of great expectations regarding the results to be obtained from the study of the scientific observations made during these expeditions, it is a distinct satisfaction to have before us the present volume. Vol. VI of the Nansen Expedition is an admirable reduction and a thoroughly scientific study of the meteorological records made during that memorable voyage of the *Fram*. Professor Mohn, of Christiania, well known the world over for his work in meteorology, has prepared the volume. In the preface Nansen pays a well-merited tribute to Dr. Mohn and to his share in contributing to the scientific success of the Expedition. It was after reading an article by Mohn that Nansen first thought of planning his voyage. "Mohn was one of the few who always believed in the practicability of the plan." He was among those who bade farewell to Nansen's party at Vardö in 1893, and was also the first friend whom Nansen and Johansen met three years later when they again landed at Vardö. Mohn superintended the meteorological equipment, verified the instruments, and planned the meteorological work. It was, therefore, eminently fitting that he should also work up the results, to which labour he has given several years. In the preface the leader of the Expedition also pays a well-merited tribute to Capt. Scott-Hansen, who superintended the meteorological work during the voyage, "thanking him once more for his faithful work during the long polar day and the long, cold polar night."

The meteorological observations embraced the following: Direction and velocity of the wind; pressure; temperature; humidity; amount; form and motion of the clouds; kind and amount of precipitation; direction of motion of the waves; state of the sea; temperature of sea-surface, and phenomena of occasional occurrence. The interesting facts should not escape notice that not only were the observations made with extraordinary care and regularity throughout nearly three years—there being hardly a break in the record—but that the conditions were remarkably uniform, in that the surface was of a homogeneous nature—viz., an ice-covered sea, with a free horizon, and with continents and

islands only at a considerable distance. After the return of the *Fram* the instruments were compared with standards. The volume begins with a description of the instruments and the mode of using them (pp. 3-22), together with the reduction of the observations; then follows a tabulation of the reduced values (pp. 25-248), and finally the results deduced from the observations are discussed (pp. 251-539). There are also discussions of *The Temperature of the Polar Ice* (pp. 540-569); *The Distribution of Atmospheric Pressure and Temperature of the Air Around the North Pole* (pp. 570-576); *Barometrical Depressions and their Motion* (pp. 577-587); *The Diurnal and Annual Periods of the Meteorological Elements in the Arctic Circumpolar Sea* (pp. 588-608). There are also added the observations made during the famous sledge expedition of Nansen and Johansen, and at the winter hut on Franz Josef Land (pp. 609-653).

The volume contains so much of interest that we are at a loss to know what to omit in calling attention to the more noteworthy points brought out in this study. The wind is the first meteorological element to be considered. In order to find the diurnal period of wind-direction three groups of seasons were made—(1) dark, (2) sunny, and (3) equatorial, with regular day and night. In the dark season the wind generally shifts against the sun; in the sunny season it generally veers with the sun, while in the equinoctial months the wind, as a rule, veers with the sun, during the night and morning, and against the sun from 10 A. M. to 10 P. M. These interesting and striking results will be of value in any future discussions of the diurnal period of wind-direction. Dr. Mohn does not, at this point, attempt to explain them. The velocity of the wind, as usual, shows a diurnal maximum about noon; the first annual maximum comes in May; the second in September and October; the velocity is greater in cloudy weather than in clear, cloudy conditions being associated with cyclones. In winter there is almost no diurnal period of wind velocity; in spring the range with clear sky is only one-half the range with sky overcast; in summer the range with sky clear is twice as great as with sky overcast; in autumn (except September) the range is much greater with sky overcast. The conclusion reached by Dr. Mohn is that the diurnal period of wind velocity is influenced rather by the *average velocity* during the day than by the change of radiation in the course of the twenty-four hours. Wind velocities over 34 miles an hour are relatively very rare. The highest observed velocity was 40 miles an hour.

Under pressure, the most noteworthy fact is possibly this, that the barometer rises most frequently with north and northwest winds, and falls most frequently with south and southeast winds. This would accord with the usual easterly movement of cyclones. The reduction of the temperature observations shows the ordinary diurnal period with a minimum in the morning and a maximum in the afternoon in March to September, when the sun is above the horizon during some or all of the twenty-four hours. During October-February, when the sun is below, or but slightly above, the horizon—the dark season—the daytime is usually colder than the night. In December the primary maximum comes about midnight, and a secondary maximum in the afternoon. A greater degree of cloudiness is associated with a smaller range of temperature, and *vice versa*. The disappearance of the solar diurnal period of air temperature during the dark season must be ascribed to other causes than solar radiation, and is probably to be found in the effects of wind, the colder, northerly winds prevailing during the day, and the milder, southerly winds during the night. Such an explanation would also account for the irregularity in the occurrence of the maxima and minima.

Weaker winds in all months except July and August mean lower temperatures, and stronger winds higher temperatures. The southerly winds are the warmest in winter, and the northerly the coldest, and this "goes far to show that the 82nd parallel of latitude is hardly influenced by the Siberian cold pole." In summer the slight difference in temperature of the different winds indicates a weak poleward temperature gradient at that season.

There is a regular diurnal period of the amount of cloud in the seasonal means, the day being more cloudy than the night. In every month the amount of cloud is greater with stronger winds. The winter months are remarkably clear, and the summer months very cloudy. The kinds of clouds were recorded regularly, and show the following general results: Cirrus, most frequent during the day; cirro-cumulus, maximum frequency 2 P. M., minimum about 2 A. M.; strato-cumulus, maximum by day; cumulus, very slightly pronounced diurnal period, maximum near noon and minimum at midnight; stratus, maximum in early morning. True cumuli are scarce, even in summer, and it is doubtful whether the cloud occurs at all in its typical form. The direction of cloud movement averages from west-northwest or northwest. The observations of rain and snow were unsatisfactory, but the amount of precipitation was very small. On July 29, 1895, it rained and snowed all day, and the amount measured on the 30th, at 8 A. M., was 0.75 inch. South and southeast winds are usually the rainy winds; northeast and northwest winds are least likely to bring rain or snow. July has the maximum number of rainy days. Fog does not occur in winter; in summer there is fog on more than every alternate day.

The temperature of the polar ice was observed as carefully as possible. The surface of the ice, in all months except June, is found to be warmer than the air. Being snow-covered for most of the year, the ice-surface is prevented from cooling by radiation, and receives heat from the warmer layers below. Other factors doubtless also enter in.

An important discussion of the pressure and temperature around the North Pole is illustrated by means of monthly isobaric and isothermal charts, in the construction of which all available reliable data were employed. The pressure at the North Pole seems to have its maximum (about 30.080 inches) in April, and its minimum (29.882 inches) from June to September, the annual range being only about 0.20 inch. In the winter months the isothermal charts show a cold pole in Siberia and in Greenland, *and also a third at the North Pole.* A study of the barometric depressions noted during the voyage of the *Fram* shows that the track of the vessel cannot be regarded as a stormy one. Depressions passed on all sides of the *Fram,* with a preponderance of those on the westerly side. In the first winter the tracks are chiefly north of the vessel; in the last they are by far most frequent in the south; in the second they are more evenly distributed, with the larger number on the west. The average track is nearly due east. The average rate of progression is 27 to 34 miles an hour.

In his discussion of the meteorological periods in the Arctic, Dr. Mohn considers the various factors which may control the periods which have been discovered, and this portion of the volume is in many respects the most important. Time fails, however, to summarize these conclusions, which are obviously of more interest to the working meteorologist than to the general reader.

Much interest also attaches to the observations made on the famous sledge journey, and at the winter hut. Through storm, and cold, and night, and all manner of hardships and privations the records were faithfully kept with a per-

sistence and a courage bordering on heroism. Let us hear Nansen (p. 613): "We had no lantern for the reading of the thermometer, and I tried in vain to construct one which would not burn more oil than we could afford to use. But our eyes, of course, became gradually trained to see in the dark, and even in midwinter, with no moonlight, there was so much light (star-light?) reflected from the snow that the column of the darkly-coloured metaxylol was dimly visible, and also the figures of the thermometer-scale, but not the division marks. . . . I do not, therefore, consider it advisable to pay too much attention to the temperature observations during the darkest time, December and January, when the moon was not above the horizon."

Let this quotation, which expresses the spirit of the volume before us, serve as a conclusion to a very inadequate notice of one of the most important recent publications in meteorological science. R. DEC. W.

The Saint Lawrence, its Basin and Border-Lands. The Story of their Discovery, Exploration and Occupation. By Samuel Edward Dawson. xl and 451 pp., 42 woodcuts and half-tone illustrations, including early Maps, Bibliography, Index, and large Map in Colours. Frederick A. Stokes Company, New York, 1905. (Price, $1.60.)

Dr. Dawson is well known for his earlier geological writings. The present book is his most comprehensive work. It is a thorough, critical, and interesting study of the discovery and exploration of the northeast coast of our continent and of the wide transverse valley of St. Lawrence to its western limits in the heart of North America. Territory not now British is, in the main, excluded from this history.

The narrative is preceded by an excellent geographical sketch, giving the general features of the regions concerned. The sketch is drawn with skill and marked by a few generalizations, clearly put and very concise, as space was evidently lacking for detailed treatment in this descriptive introduction. The following quotations will show the quality of these generalizations.

> The peculiar "V"-shaped course of the main river [St. Lawrence] valley is due to the fact that the primary Laurentian nucleus of the continent is of that shape, and, along its edge, in an alluvial valley resting on Silurian rocks, the river flows and expands into broad lakes.
>
> The characteristics of the Laurentian country, which forms and feeds the great river from the north, are very marked. It is a plateau, two or three hundred miles wide, of ancient hills or mountains 1,000 to 1,600 feet above the sea, rounded in form by the immense lapse of ages and forest-clad to their summits. Myriads of lakes connected by countless mazes of streams gather up the waters which flow down to the lower level in rapids and falls along the entire edge of the valley. At the heads of the streams and their tributaries the waters interlock so that, in the early days of the colony, the Indians would pass from one to the other and bring their furs to market by the Ottawa, St. Maurice or Saguenay, according as one or the other was free from hostile Indians.

This geographical sketch is supplemented with a fine orographical map by Bartholomew, which graphically shows these and other surface features noticed in the text.

The reason is plain why exploration in this vast region was long more vigorously and fruitfully pursued than in other parts of the continent. Explorers here met no such barrier as the ranges of the Appalachians, which so long retarded discovery farther south. They found easy access up the valley to the fresh-water seas, across the portages to other basins, and on to the Mississippi itself. These great explorations were replete with geographic and historic interest and abounded with romantic adventure; and the author tells the story well, for he is in full command of these rich resources for book-making.

He deals critically with the work and the value of the work done by each explorer along the coast and up the valley, and he follows them to the water-partings between the St. Lawrence and other rivers that go to join the Atlantic to the north or south of the St. Lawrence Basin. This inquiry leads him here and there into portions of the United States.

He deals also with the difficulties presented by the old maps and charts, portions of a number of which are reproduced. Many readers, if they will carefully peruse Chap. I, may derive a more intelligent idea of these old productions, understand their imperfections better, and learn how they may be utilized in some ways. There was room for so excellent a book as this on the exploration of the St. Lawrence Valley.

Italy. A Popular Account of the Country, its People and its Institutions (including Malta and Sardinia). By Professor W. Deecke. With numerous Maps and Illustrations. Translated by H. A. Nesbitt, M.A. London: Swan, Sonnenschein and Co., Ltd. New York: The Macmillan Co., 1904.

As an antidote to the numerous "travel books" on Italy, as well as to those of a more specialised nature, comes this comprehensive and authoritative account of the country, its structure and surface, its resources, and its folk.

Six chapters, about one-fourth of the book, are devoted to the purely physical aspects of the country, the subjects included being Boundaries, Surrounding Seas, Relief, Geological Construction, Hydrography, and Climate. These pages form the backbone of the book, and their careful reading will well repay one who wishes an intelligent foundation for the special line of knowledge of Italy which he is following. Whoever attempts this will be disappointed at the lack of adequate maps in these chapters. This omission is all the more lamentable, as not everyone has a general map of Italy at hand on a large enough scale to enable him to follow the details of relief, construction, and topography here presented. On page 35 the author refers to "the accompanying geological map"; but this has been omitted, at least from the English translation, with great detriment to its usefulness. The introduction of numerous sketch maps and the condensing of certain technical details in Chapters IV and V would have been desirable in view of the popular character of the book.

Especially noticeable in the pages mentioned above is the scant attention the author gives to showing relations between things organic and inorganic—an omission that is surprising in a land where the responses of organic forms to their inorganic environment are so suggestive. It is, however, a satisfaction to note instances in which the correspondence between structure and topography is clearly presented, though these are not as frequent as the recent date of publication would lead us to expect. The following description of the region of the *eocene* marls is illuminating to one who remembers the railway journey from Bologna to Pistoja:

> Rounded gentle slopes, deeply cut valleys with broad pebbly bottoms and dirty muddy water, are characteristic marks of the formation. The rock crumbles after a fall of rain; it is completely broken up by frost and thus easily forms landslips—a great danger to roads and railways, and only to be remedied by alteration of route or by thorough drainage. As a rule, nothing grows on these barren slates and clays but scanty grasses, so that extensive tracks lie nearly bare, allowing free play to the rain, which generates flowing waves of mud which from time to time trouble the country near the Bologna Apennines.

And again:

> This undermining activity of the Apennine rivers is a constant source of danger to all bridges, as walls

of even deep foundation are found insufficient, the supports being carried away from behind or from below. Train traffic is constantly being interrupted in the spring, and for the most part in consequence of the threatened fall of a bridge, or of inroads of mud. In the Apennines near Modena there have been counted during the last three hundred years forty-three large mountain slides of the soaked *eocene* marls and the chalk or the *pliocene* clays and sands.

In the chapter on hydrography the author writes with constant reference to the human activities so long at work in the river valleys and lake basins, and the maps and diagrams are many and excellent. He takes up the characteristics of the rivers of different sections as they are influenced by length and direction of slope and the nature of the underlying rock, contrasts the Alpine and Apennine Rivers, tells of the recent changes in the Upper Arno and the swings of the Volturno, and describes in detail the delta of the Po and Adige, with the vigilant control exercised by man upon their inundating floods of waste. It is amusing, however, to come upon such archaic geographical expressions as "the Arno *broke through* the chain and created the moist plain of Pisa," and "the Tiber *bursts obliquely* through the Umbrian chain." Such expressions recall "the mighty convulsions of Nature," which used to account some fifty years ago for water gaps and other innocent episodes of a river's history. In spite of the fact that Prof. Deecke has failed to interpret the varied elements of the surface of Italy in the light of the recent progress made by investigators of geography, he has done a good service in these early chapters in putting into compact and readable form a wealth of excellent material, from which the reader may be able to construct the different stages in the development of that Italian landscape which has attracted students of all ages to its interpretation.

A very detailed and lively presentation of the natural resources of Italy and of the way these are turned to the account of profit or loss by the Government and by individuals is given in the chapters on Plants and Animals, Products, Commerce and Manufactures, and Political Institutions, and they form a serious contribution to our knowledge of the country. Readers may not agree with some of the author's views as to the causes and remedies for the evils which exist in Italy to-day, but they will get valuable information as to the economic and social conditions of modern Italy, though the picture would have been truer if more emphasis has been laid on the steady, if slow progress which the nation is making toward higher ideals of self-government and individual responsibility. Among the many excellent descriptions in Chapters VIII and XI may be mentioned those of the olive tree, the wild flowers, the vintage, and the life and surroundings of the miserable charcoal-burners.

By far the longest chapter in the book is that entitled Topography, and there is scarcely a place or district of any importance that is not here described with evident appreciation of the charm that a beautiful setting has lent to the impressive history of this peninsula. It is here that we first find the geology, geography, and history, not treated as isolated phenomena, but woven into a well-presented summary of the separate indictments of the previous pages. It will probably astonish the reader that the author sees in the present aspect of the Forum only "a miniature desert," and in the palaces of the Cæsars "only a dreary, hot, and dirty waste of rubbish"! Opinions differ; they are not conclusions to be verified. The statement, however, that Orbitello is "as unhealthy a town as there can possibly be, almost abandoned in summer on account of fever," cannot be accepted without investigation, since so great an authority on Tuscany as Mr. Carmichael says:

> The climate of Orbitello is sweet and healthy. The citizens of Grosseto flock here in the summer months, for their own city has become dangerous.

The author's discriminating account of the varied elements which make up the population, the differences in speech and manners, work and pleasures which these entail, will be read with pleasure and profit. A slight sketch of Italian history and art round out the completeness of this volume.

While the translator has in the main done justice to the author, he must be censured for many awkward sentences, for faulty punctuation, and for numerous errors due, evidently, to careless proofreading. Thus the omission of a cipher in the statement of the capacity of the Coliseum reduces it to about the size of the Mormon Tabernacle; Monte Mario masquerades as Monte *Maria;* the genitive of Nerva is written *Nerviae,* possibly to conform to *Trajani* and *Augusti,* which precede it; *east* and *west* are several times confused, and there is more than one instance where reference is made to a wrong page. The familiar line of Horace is printed on p. 387: Vides ut *alte* stet nive candidum. It is useless to speculate on who is to blame for the remarkable use of the apostrophe in the title on the cover. The printer's devil does not work in refined gold or he might be the scapegoat; perhaps, as the book bears the imprint of a London house, it is an Anglicism not current in America.

The latter half of the volume abounds in full-page illustrations, many of which are printed from recent cuts and are clear and satisfactory, and the numerous sketch maps in the last chapter do good service in expounding the text. There is a good index, some interesting tables of statistics, and an excellent summary of the essentials the author has tried to emphasize. The book deserves to win a place as a valuable all-round authority on Italy. C. W. H.

Vorläufiger Bericht über eine in den Jahren 1902 and 1903 aus geführte Forschungsreise in den zentralen Tian-Schan. Von Dr. Gottfried Merzbacher. Gotha, Justus Perthes. 1904. (P. M. E. Nr. 149.)

The author's explorations in the Central Tian-Shan have enriched our knowledge of that region with a considerable number of most important facts. In the first place must be mentioned his search for the Khan Tengri Mountain, which has resulted in his ascertaining, for the first time, the actual location of the dominating peak of the Tian-Shan. It differs quite considerably from that assumed by former visitors of the country, and even from the data of the official Russian 40-verst survey map. The author's experiences in trying to get near the mountain furnish in themselves the best explanation why such an important question could remain undecided so long. The peak of Khan Tengri, even in an environment of other peaks about 20,000 feet high, rises so high above all of them (about 3,000 feet) that its characteristic outline appears at the background of almost every valley or glacier in that region, and seems to be the culminating-point of each succeeding range of mountains which one approaches. The author realized that only one who had actually stood at the base of the mountain would be able to say where it is, and therefore resolved to use the means of Alpine sport for the service of science, and, with two Tyrolese guides, climbed over one range after the other, and across one glacier after the other, until the goal was reached. The story of this search for the enchanted mountain which seems to be everywhere and nowhere is one of the most fascinating chapters of geographic exploration. It was found that Khan Tengri is not, as has generally been supposed, the central knot from which the ranges of central Tian-Shan radiate. It rises from a secondary ridge which branches off from the main range at about the place

where the 40-verst map located it. There *is* an imposing mountain at this place, which faces the valley with an almost vertical wall of marble, about 6,000 feet high; but it is not Khan Tengri. The author named it Nicolai Michaelowich in honour of the Russian Grand Duke and President of the Imperial Geographic Society of Russia, who has given so much help and encouragement to the exploration of Central Asia. Khan Tengri, however, while visible back of almost every valley and glacier, as stated above, has its actual basis at the upper end of the Inyltshek Valley and glacier, one of the great longitudinal valleys of the Central Tian-Shan, which opens into the Sarydshas Valley. This glacier, from 65 to 70 versts long, is one of the largest of Central Tian-Shan, and is divided into a northern and a southern branch by the ridge which culminates in the white pyramid of Khan Tengri. The two glaciers in the parallel valleys north of it, the Semenow and Mushketow glaciers, are in no way connected with it. It is from the Inyltshek Valley that an ascent must be made, if it can be made at all, for the snow in the highest part of that region was found to be almost impassable. The climate is so dry that the snow is loose, like sand, and the insolation is not strong enough to start regelation. Névé is hardly ever formed, therefore, and beyond a certain height the fields of loose snow seem to forbid the attempts even of trained Alpinists.

The lack of relation between the general structure of the ranges and the distribution of the highest peaks, of which Khan Tengri is an example, seems to be typical for the Central Tian-Shan; in this, as in many other respects, it differs very distinctly from the Alps, whose principal peaks rise at the crossings of the principal chains. Geologically, the pyramid of Khan Tengri consists entirely of rocks of sedimentary origin; granites, gneisses, and cristalline schists having been found nowhere in the Central Tian-Shan. In the Khan Tengri region, as elsewhere in that neighbourhood, granites and metamorphic rocks do not constitute the central ranges, as they do in the Alps; these ranges consist entirely of limestones, marbles, slates, with occasional intrusions of basic rock, mostly diabase. A band of black diabase, for instance, runs all around the white marble pyramid of Khan Tengri, adding greatly to the beauty of its appearance. The dip of the strata, which is northerly in the ranges north and southerly in those south of Khan Tengri seems to indicate that the mountain itself is a remnant of an old anticline which was broken by dislocations along its periphery and of which the centre alone has remained standing. The generally parallel structure of the ranges of the central Tian-Shan, as observed by others before him, has been confirmed by Dr. Merzbacher's observations; his geologist further succeeded in defining the age of the peripheral ranges north and south as Lower and Upper Carboniferous, respectively, and the valley formations as Tertiary.

The travels of the author along the southern foot of the Tian-Shan enabled him to correct another erroneous geographic tradition. He found that the southern slope of the mountains toward the Tarim Basin is not at all abrupt and "wall-like," as had been supposed by most geographers, but that steep slopes, wherever they do exist, are the exception rather than the rule. In general, the parallel chains of the Tian-Shan slope quite gradually toward the plain, each following range being lower than the preceding one, and the transverse ridges adapt themselves to their grades. That erroneous impression can have arisen only, according to the author, by the prevailing haziness of the atmosphere, which is very apt to create exaggerated impressions of vertical elevation, together with the sharp sunlight of the steppe, which also has a deceptive influence in this respect. As he traversed the country early in spring, at a time when neither of

these influences was developed to any extent, he was able to get more accurate impressions than his predecessors, all of whom visited that region later in the year.

Finally, he ascertained that the lower course of the Sarydshas River, which collects the waters of the central Tian-Shan toward the Tarim River, is not identical with the river coming down through the Dshanart Valley, as had been supposed, but that it corresponds to the river known to the natives as Kum Arik (channel of the desert), which breaks through the parallel ranges in a deep transverse valley, so narrow as to be absolutely inaccessible when the river carries the full amount of water. As this is the case throughout the warm season, the river being supplied by all the glaciers of the central Tian-Shan, only a mid-winter expedition would be able to enter that valley and trace it up to the explored parts of the Sarydshas course.

The study of glaciers and valleys also formed an important part of the programme. Like others before him, the author found evidences of an extensive glaciation everywhere. The present glaciers seem almost stationary, since the large supply of snow from the highest regions will replace any amount of loss due to melting at the base of the glacier; only on the Mushketow glacier were slight traces of recession noticeable. A peculiar feature of all the glaciers in the neighbourhood of Khan Tengri is the innumerable ice-lakes which they contain—funnel-shaped, and from 600 to 1,000 feet "large" (the author does not explain whether this means diameter or circumference)—whose origin is still to be explained.

A large-scale map and two beautiful mountain panoramas made of 8 x 10-inch plates are great helps to a proper appreciation of the text, and both text and illustrations make the reader look forward to the publication of the complete report, which is to follow upon this preliminary one. M. K. G.

Reisen im westindischen Mittelmeer. Von Dr. Georg Wegener. Berlin, 1904. Allgemeiner Verein für deutsche Litteratur.

The book is a collection of letters containing records of the author's travels in Central America, which were written originally for the "Tägliche Rundschau" at Berlin. While not claiming to be scientific (as shown by the choice of the publisher and by its origin), it belongs to the best that has been written in the line of light geographic literature, whose principal value consists in awakening the interest in geography among the wider reading public, and for being pleasant reading it is no less rich in reliable information about the places visited. The list of the latter comprises the island of St. Thomas, Martinique, and an ascent of Mont Pelé, together with an account of its eruption on March 26, 1903; Jamaica, the Colombian cities of Puerto Colombia, Barranquilla, and Cartagena, Panama and the Canal region, Costa Rica and its capital San José, and an ascent of the Costa Rican volcano Irazu. The author's well-known skill in portraying, in short sketches, the characteristic features of the countries and nations visited is entirely up to the mark of his former publications, and even the professional geographer who will spend an hour of leisure with him will not lay the book aside without feeling indebted to the author for some new sidelights on otherwise familiar subjects. M. K. G.

Historic Highways of America. By Archer Butler Hulbert. Vols. 8–16. The Arthur H. Clark Company, Cleveland.

Vols. 1–7 of this series were noticed in this BULLETIN, Vol. 36, page 54, 1904. The work is now complete, and calls for a reference to the remaining parts. Vol. 8

deals with the Military Roads of the Mississippi Basin, and the conquest of the old Northwest, as accomplished by the expeditions of George Rogers Clark, Harmar, St. Clair, and Wayne, between the years 1778 and 1794. In view of little previous attention to the actual route followed by Clark, the author attempts a careful identification of various points on the line of march.

A passage from Clark's memoir shows that he hurried to cross the flooded grounds of the Little Wabash, not only in patriotic ardour to reach Vincennes, but that his men might see all hope of retreat cut off, and prefer to meet future danger rather than encounter again the sort of hardship which they had already endured. The following maps are reproduced: Hutchins's Sketch of the Wabash in 1768 (from original in British Museum); part of Arrowsmith's map of the United States, 1796; Dr. Belknap's Map of Wayne's route in the Maumee Valley, 1794 (original in Library of Harvard University). There is also a sketch map of parts of Illinois, showing routes pursued by Clark's expedition.

Waterways of Westward Expansion is the theme of Volume 9. The preface and opening pages contain some just observations on the importance of the Ohio River. These appeal to the physical geographer, both on account of the extent of basin, the variety of surface, the large rainfall and run-off, and the wealth of resources. To the historian the appeal is equally strong, in connection with the first great westward movement and the subduing of the country within and beyond the Appalachians.

Chapter III consists largely of quotations from "The Navigator," a guide-book to the river and to adjacent regions, published in Pittsburg, in 1801, by Zadok Cramer. Population, towns, products, commerce, and directions for the voyage come in for attention. The "Evolution of River Craft" affords an entertaining chapter, with many features of old life on the river vividly presented. "Three Generations of Rivermen" follows appropriately.

The tenth volume is on the Cumberland Road, commonly known as the National Road, and perhaps it might have been better to use the latter title, owing to the danger of popular confusion with the Wilderness Road, through the Cumberland Gap. This was built from Cumberland, Maryland, westward, connecting eastward with Baltimore and Fredericktown. The author gives the history of inception and construction, and follows with popular and interesting details about the coaches, freighters, mails, and tavern life of this great highway.

Volumes 11 and 12 are devoted to "Pioneer Roads," and Volumes 13 and 14 take up "Great American Canals." The Pioneer Roads form two rather miscellaneous volumes, containing much interesting material, but betraying the lack of order and organization, which is too characteristic of the series as a whole. There are chapters on Braddock's Road, the Genesee Road, the Catskill Turnpike, and "Dickens on Pioneer Roads," the last being mainly quotations from Dickens' *American Notes*, evincing the author's passion, if such it may be called, for wholesale quotation. This aspect of the series tends to make it a source of history rather than a history.

The volumes on the canals have much more unity, one being given to the Chesapeake and Ohio Canal and the Pennsylvania Canal, while the other is wholly about the Erie Canal. It can hardly be said that the last will serve as a final history of the great ditch, but it is certainly the one available, and therefore most welcome, story of this large work of the Empire State.

Volume 15 is on The Future of Road Making in America. This, too, is but a fragmentary treatment, as a kind of supplement to the whole. It deals briefly with the recent movements for the improvement of earth roads, including Government co-operation, the meaning of good roads to the farmer, and a closing chapter on

Stone Roads in New Jersey. Volume 16 is given up to an index, a valuable addition, as giving a clue to the great mass of material, which too often seems unrelated and discontinuous.

As a whole, these later volumes of the series perhaps show less tendency to pad with undigested source materials, and are more adequately illustrated as regards maps. This reviewer sees, however, no reason to change the opinion formed by examination of the earlier volumes, that the series, while valuable and almost indispensable to students of American geography or American history, is not as thorough, orderly, and useful as the subject demands. While we recognize a distinct debt to Mr. Hulbert for the large work which he has done, we could wish it done with less haste, in fewer volumes, and at one-half or one-third of the cost to those who wish to possess the work. A. P. B.

Dar-Ul-Islam. A Record of a Journey through Ten of the Asiatic Provinces of Turkey. By Mark Sykes. With Appendix by John Hugh Smith, and Introduction by Prof. E. G. Browne. xviii and 294 pp., 73 pictures, 22 maps, and Index. Bickers & Son, London, 1904. Imported by Charles Scribner's Sons, New York. (Price, $5.)

The travels here described embraced the most of Anatolia (including Armenia) and Syria as far south as Damascus. Dar-ul-Islam means "The Home of Islam." Many of the descriptions relate to regions that are little hackneyed in the literature of travel; and the distinctive merit of the book is that it throws light upon the actual conditions now existing in a large part of Asiatic Turkey. The writer's style is sprightly, and his purpose is not very serious; but his book is full of acute observations about regions concerning which curiosity is not yet sated. The tone is that of the following passage (p. 171):

> Who pretends to understand orientals? Few Europeans who have lived among them all their lives would admit that they had fathomed more than their own ignorance. Burton, Burckhardt, and a few others may have known something, but not all. . . . Indeed, it is not a good thing to know too much of orientals; if you do, perhaps you may wake up one morning and find you have become one.

Mensch und Erde. Skizzen von den Wechselbeziehungen zwischen beiden. Von Alfred Kirchhoff. Zweite Auflage. 127 pp. B. G. Teubner, Leipzig, 1905. (Price, M. 1.25.)

The first edition of this book appeared in 1901. It contains seven lectures illustrating, in a striking manner, the relations between man and his physical environment. The titles of the chapters are: 1, "Das Antlitz der Erde in seinem Einfluss auf die Kulturverbreitung;" 2, "Das Meer im Leben der Völker;" 3, "Steppen und Wüstenvölker;" 4, "Der Mensch als Schöpfer der Kulturlandschaft;" 5, "Geographische Motive in der Entwickelung der Nationen;" 6, "China und die Chinesen;" 7, "Deutschland und sein Volk."

OBITUARY.

SAVORGNAN DE BRAZZA.

A cable dispatch received by the Minister of the Colonies, in Paris, on the 15th of September, announced the death of Count Savorgnan de Brazza, at Dakar, on his way home from the French Congo.

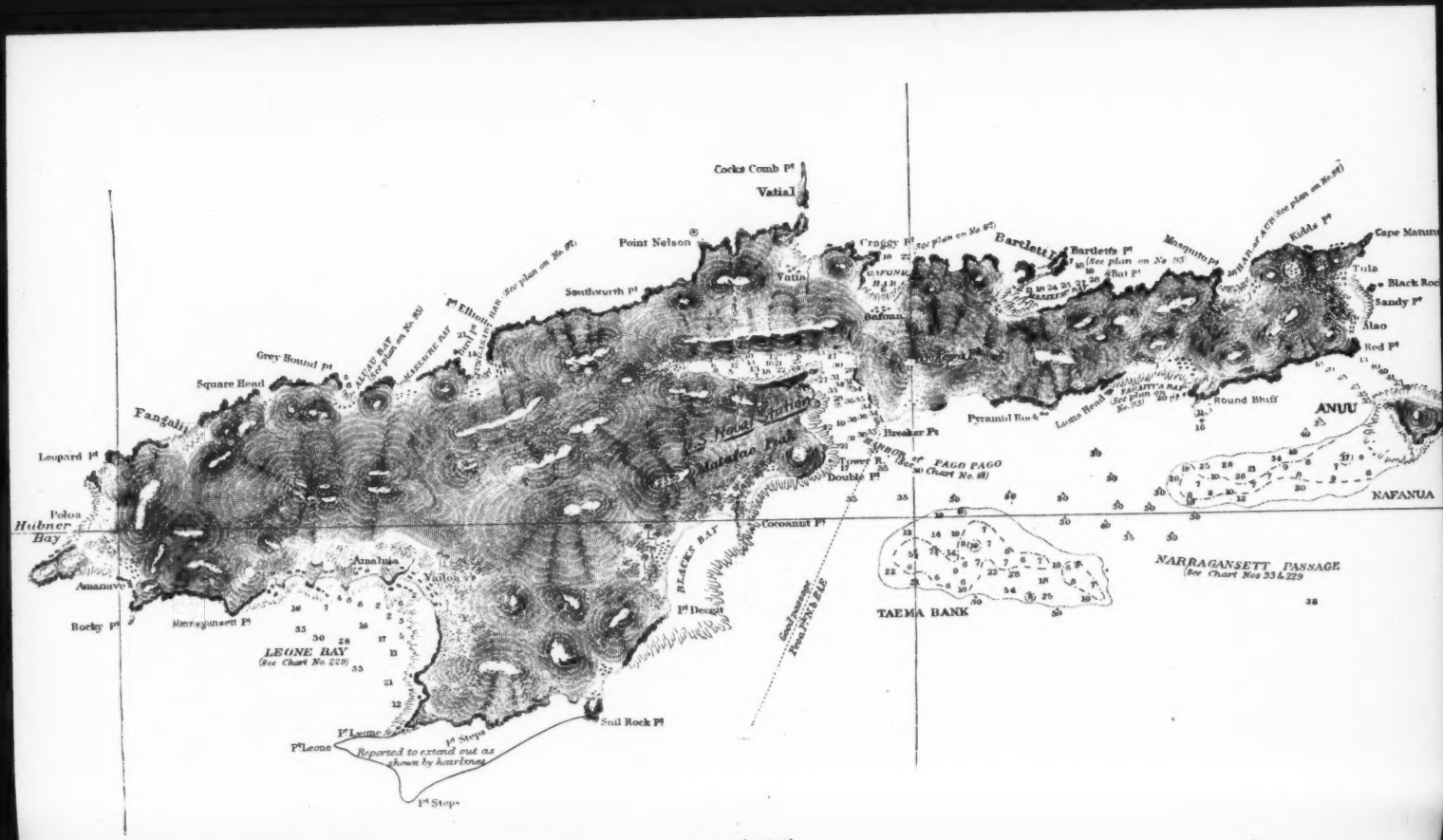
M. de Brazza was born January 26, 1852, on board the French ship *Vénus*, in the roadstead of Rio de Janeiro. He was of Italian race, and the family name is said to have been di Brazza Savorgnani.

He was educated in the Jesuit College in Paris, and was recommended by Father Secchi, the celebrated astronomer, to Admiral de Montaignac, and admitted in 1868 to the Naval School at Brest. In 1870 and 1871 he served in the fleet in the North Sea and on the Algerian coast, and in 1872–74, under Admiral Quiliot in America, the Cape of Good Hope, and on the West African coast. In 1874 he received his papers of naturalization, and was sent the next year to explore the Upper Ogowe River.

His companions were Dr. Noel Ballay and the naturalist M. Marche. The work of this expedition, which occupied three years, was completed by two explorations in the years 1879–1886, and the Colony of the French Congo, as now constituted, with an area equal to that of California, Nevada, Oregon, and Washington, is practically the creation of de Brazza, and his gift to France. Throughout his career as explorer and as Commissioner of the Government of the Republic in West Africa, his course was marked by decision and tact and humanity. He practised in his relations with the Africans the principles set forth in his own words:

> these primitive people are not difficult to manage, if we avoid offending them and steadily maintain in our dealings with them an attitude of firmness, and good will without weakness, and an unlimited patience.

The death of such a man as de Brazza, at the age of fifty-three, may well be called untimely, though he had already won his place among the founders of civilization in Africa.



TUTUILA (SAMOA).